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Tårup

A round dolmen and its secondary burials

by Mads Kähler Holst

ABSTRACT

In 1992 a well-preserved round dolmen covered by a Bronze Age burial mound was excavated at the village of Tårup between Vejle and Fredericia in East Jutland. The chamber can be classified as a dolmen without passage, but with access by a threshold construction. It contained no primary burial, but an undisturbed floor that may be the original. The mound seems to have been constructed in two stages, and the kerbstones may have been free-standing for some time before they were incorporated in the mound. The mound construction was accompanied by firings on the unfinished mound. A quantitatively modest ceramic material from MNA I and perhaps late EN was deposited in front and on top of the finished mound construction. The chamber and the mound of the dolmen were used for secondary burials in the Single Grave Culture, the Late Neolithic and the Early Bronze Age.

INTRODUCTION

In July 1992, construction work on a highway between Vejle and Fredericia in East Jutland literally passed through a hitherto unrecorded prehistoric monument near the village of Tårup. The monument consisted of a dolmen in a round barrow, covered by an Early Bronze Age burial mound, surrounded by a ditch 57 m in diameter and 1.5 m deep.

The central part of the Bronze Age burial mound, probably including the primary burial, had been destroyed by the construction work before archaeological investigations were initiated. The dolmen and its secondary burials, on the other hand, were situated on the north-western periphery of the burial mound, outside the highway construction area, and protected by the mound fill (Fig. 1). Consequently, these structures were extraordinarily well preserved. This article presents the results of the excavation of the dolmen and its secondary burials.

The investigation was conducted by Vejle Museum (Site identification: VKH 1584) under the direction of Lone Hvass, and in close cooperation with the Danish Road Directorate. First the plough layer and the covering mound fill from the Bronze Age burial mound was removed mechanically. After registration of the surface, the dolmen was excavated manually in four quadrants, leaving a cross bench and the major stone structures, i.e. the chamber, the kerbstones and associated stone pavings. Finally, the megaliths were removed. The chamber fill and a concentration of burnt flint outside the chamber were brought back to the museum for flotation. A large area around the dolmen was also uncovered in connection with the excavation of the Bronze Age burial mound.

TOPOGRAPHY

The dolmen at Tårup was situated above the Elbo tunnel valley, in a typical undulating East Jutlandic moraine landscape 5 km north of the nearest coastline at Gudsø Vig. Until the Late Medieval period, the Elbo Valley presumably formed a navigable connection between Vejle and Kolding Fjords, blocked only by a

Fig. 1. Aerial view of the Tårup-excavation. Road construction work to the right has removed the center of the burial mound.

narrow land barrier at the southern end (Nordmann 1958).

A profile through the subsoil below the monuments at Tårup showed that the dolmen and the Bronze Age burial mound had been constructed on 1.0-1.5 m thick moraine loam atop melt-water sand (Breuning-Madsen & Holst 1995).

Several other megalithic graves have been recorded along the Elbo valley in the immediate vicinity of the Tårup dolmen. One contained a polygonal dolmen chamber, while none of the others have been subject to archaeological investigations, and are almost completely ploughed down today.

TRB-Structures

Below the dolmen a few possible ard marks were observed. The presumed ard marks were superimposed by a 10 cm thick, dark layer characterized by a high content of humus and charcoal, but without any artefacts. The dark layer was found everywhere beneath the dolmen, and also extended down into a 70 cm wide and 15 cm deep pit beneath the northern part of the dolmen.

The chamber of the dolmen

The chamber had a rectangular to slightly polygonal ground plan with inner dimensions of 2.2 m NNW-SSE by 1.3 m ESE-WNW. The chamber was symmetrically constructed, with two uprights on each long side, a slanting end stone resting on a base stone at the north end of the chamber and an entrance stone at the south end. A capstone was lacking, and had probably already been removed in the Late Neolithic, in connection with a secondary burial in the chamber, but otherwise the chamber construction must be considered completely undisturbed.

The dolmen can be classified as an *erweiterte Dolmen* according to E. Schuldt's typology based on the megalithic tombs of Mecklenburg (Schuldt 1972). Especially the Klokkehøj-dolmen on Southern Funen, and the group of dolmens defined by Thorsen as the Klokkehøj variant of the *erweiterte Dolmen* show many constructional similarities with the dolmen at Tårup (Thorsen 1981).

All the uprights, except the entrance stone, slanted inwards, and had been placed with their heavier ends upwards and the plainest surfaces inwards. The slanting end stone rested on all uprights, and in this way locked the construction. The supporting megaliths had all been secured in clay, either by being dug into the subsoil, or by the construction of a clay packing around the stones (Fig. 3b). Besides stabilising the chamber construction, the fastening of the stones in the subsoil also levelled the height of the chamber stones.

The uprights had been placed closely together, leaving only minimal gaps, except in the southern corner of the chamber, where an extra stone had been inserted, seemingly with no supporting functions and not fastened in clay. The remaining minor gaps were filled with dry-walling of flagstones and small field stones. A layer of thin flagstones was also found between the slanting end stone and the base stone (Fig. 2c; 3c).

A packing of large stones fastened in clay surrounded the northern part of the chamber, and similarly the exterior gaps between the uprights had been filled with a stone- and clay packing (Fig. 2d; 3a-b). The outer layer of the stone packing consisted of large flat stones, creating a sort of roofing, which is also known from a number of other Danish megalithic tombs; a so-called 'water nose' (Hansen 1993, 56).

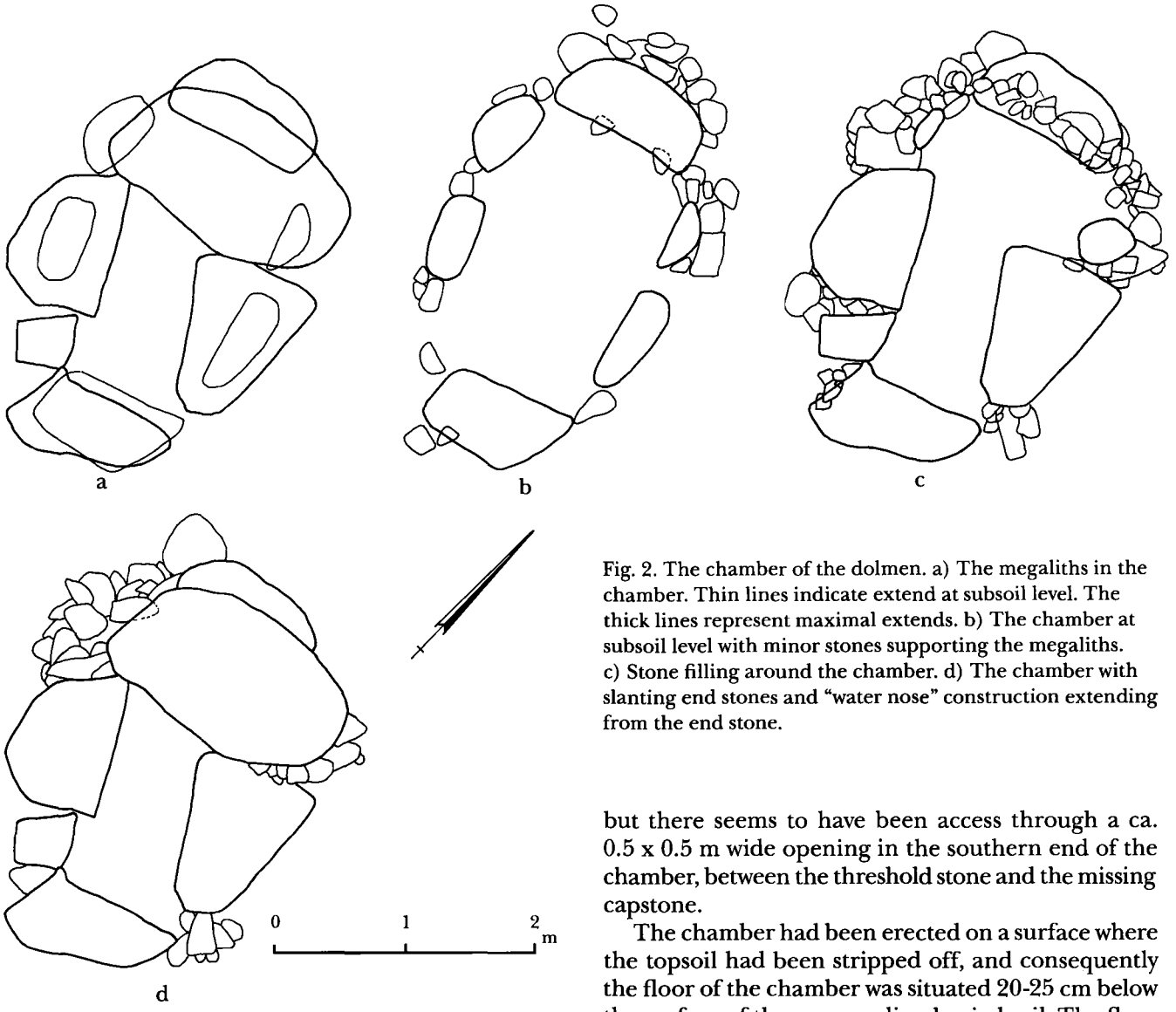


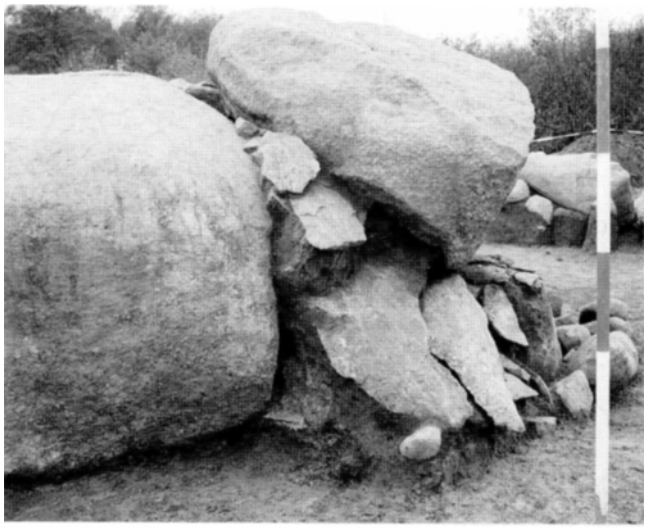
Fig. 2. The chamber of the dolmen. a) The megaliths in the chamber. Thin lines indicate extend at subsoil level. The thick lines represent maximal extends. b) The chamber at subsoil level with minor stones supporting the megaliths. c) Stone filling around the chamber. d) The chamber with slanting end stones and "water nose" construction extending from the end stone.

The chamber formed a completely stable construction, and with the stone- and clay packing around the chamber together with the roofing construction, the dolmen chamber appeared as a well-defined completed entity, also when seen from the outside. It is thus possible that the chamber could have been free-standing in this form for some time before the construction of the mound around it; however no observations at the excavation could unambiguously confirm or deny this possibility.

There was no passage leading to the chamber, but there seems to have been access through a ca. 0.5 x 0.5 m wide opening in the southern end of the chamber, between the threshold stone and the missing capstone.

The chamber had been erected on a surface where the topsoil had been stripped off, and consequently the floor of the chamber was situated 20-25 cm below the surface of the surrounding buried soil. The floor consisted of stamped subsoil material, which was burned red in two areas, respectively 20 and 40 cm in diameter. The clay floor was covered by a 2-4 cm thick layer of charcoal and white burnt flint. The charcoal and flint had been carefully spread out in an even layer all over the chamber floor, and most probably the flint had been sorted, as it consisted only of very small, strongly burnt pieces.

There were no traces of a primary burial in the chamber, but a secondary burial from the Single Grave Culture had been placed directly on the flint layer without disturbing it. The fact that the secondary burial was placed directly on a seemingly undisturbed



a

b

c

Fig. 3. The northern end of the chamber with the slanting end stone and the stone packings around the chamber seen from a) east, b) west, and c) north.

TRB floor indicates that the chamber had been sealed until the secondary burial was inserted, and that there had been no dramatic and destructive clearance. Consequently, the possibility cannot be ignored that the lack of inorganic grave goods from the TRB culture simply reflects the fact that none were deposited in the chamber.

The mound, the kerbstones and the stone pavings

Several clearly distinct layers of fill could be observed in the cross sections through the mound (Fig. 4). Some of these layers are most probably merely stages in a continuous building sequence. However, stone pavings and kerbstones indicate that at least one of the intermediate stages represented some sort of temporary completion of the mound construction.

The first stage in the construction of the mound consisted of clayey loam with stripes of loam, indicating that the fill had been packed diagonally against the chamber (Fig. 4, fill f). This material could be identified all around the chamber, and extended 1.5 to 2.5 m outside of it, forming a circular ground plan 5.5-6.0 m in diameter. The clayey loamy material was superimposed by a greyish brown sandy loam, which was also found all around the chamber (Fig. 4, fill g). There were no indications that the transition from fill f to g represented a break in the construction sequence, and the difference probably indicates a change in building material.

On the other hand, fill g was bordered in the southern quadrant by a wall-like construction of stones, 0.2 m across, placed in up to four layers (Fig. 5b). The wall construction may have formed a full circle, even though it was only observed in the southern quadrant. To the southeast a large pit, and to the north a Late Neolithic burial, had probably removed the stone wall. To the east and northwest, a potential stone wall could not be distinguished from the final covering cairn phase of the mound.

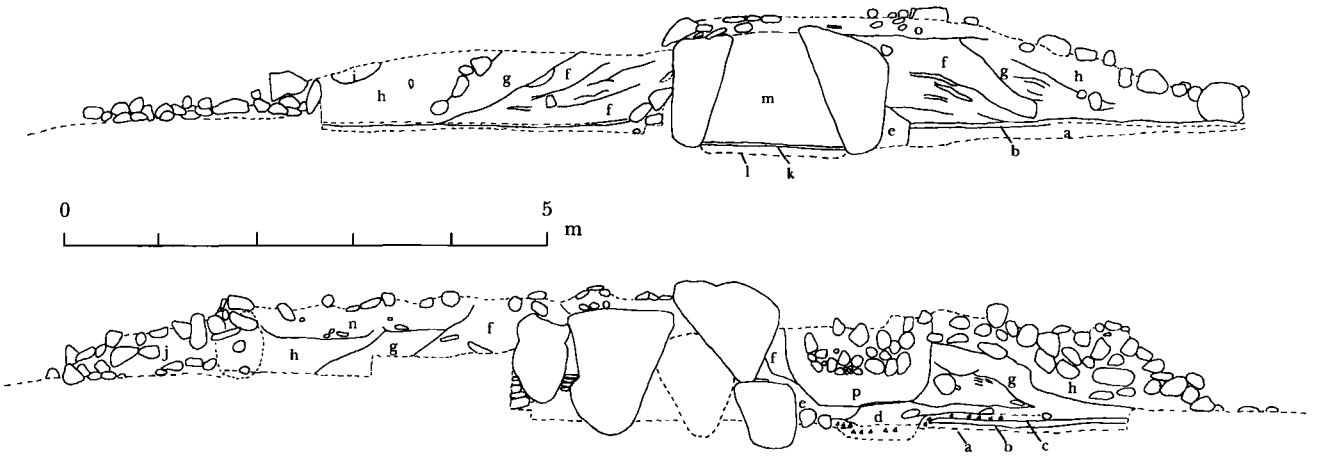


Fig. 4. Crosssection through the dolmen. a) Subsoil. Reddish to yellowish brown loam. b) Buried, decomposed vegetation layer. Gradual transition to the subsoil below. Light greyish brown loam. c) Cultural layer. Black layer with a high content of charcoal. d) Probable cultural layer marked by gleying. Greyish sandy loam with manganese coatings. e) Clay packing around the chamber. Light brown clay. f.) Mound fill. Initial stage. Yellowish clayey loam with diagonal stripes of loamy material. g) Mound fill. Initial stage. Greyish brown loamy sand. h) Mound fill. Final stage. Light brown, slightly loamy sand. i) Stone trace. Brown loamy sand. j) Eroded fill. Homogeneous greyish brown. k) Floor in chamber. White burnt flint and charcoal. l) Floor in chamber. Yellow, stamped locally red burned loam. m) Caved in fill. Very porous, dark greyish brown sandy mould. n) Fill in burial D. Greyish light brown, loamy sand with minor pieces of charcoal. o) Fill in burial F. Yellowish light brown, loamy sand. p) Fill in burial C. Greyish brown, loamy sand with minor pieces of charcoal.

The stone wall must represent at least a temporary conclusion of the mound construction, with a diameter of 6.5-7.0 m. In front of this initial stage, a fragmented stone paving of thin, flat stones was uncovered (Fig.5a). It is doubtful if there ever was a continuous paving all around the dolmen.

The stone paving was covered by a slightly loamy sand material (Fig. 4, fill h) superimposed by a cairn-like stone packing, which, especially to the north and east, was solid and preserved in up to five layers. Originally, the stone packing probably covered the entire dolmen surface, although the capstone of the chamber might have been visible above the stone packing.

The stone packing marked the second stage in the mound construction, and was delimited by a well-preserved kerbstone arrangement, forming a perfect circle, 8.0 m in diameter. Thirty four kerbstones were found in situ or slightly displaced during the decay of the dolmen, while an estimated eight stones were missing (Fig. 5).

There was no dry-walling between the kerbstones, and the stones had not been dug into the subsoil. Several kerbstones were, however, supported by small stone settings, which clearly showed that the kerbstones had been erected before the construction of the mound. This raises the question of whether the kerbstones were erected in connection with the construction of the first stage of the mound, so that the kerbstones were standing freely for a period, leaving a small area between the kerbstones and the stone wall-delimited mound. All the kerbstones in situ were able to stand without support, and the fragmented stone paving in front of the stone wall of the initial mound stage extended precisely to the kerbstones. Furthermore, the pressure of the mound fill and cairn construction had also overturned several of the kerbstones. This might be seen as an indication that the kerbstones were not originally intended to hold back mound fill.

In front of the kerbstones, traces of another irregular stone paving were uncovered (Fig. 6). It extended up to 2.0 m from the kerbstones, and traces of a paving were found all around the dolmen, varying in character and extension. It is again difficult to assess if the paving was once uniform and continuous all the way around the dolmen, but it is worth noting that the most complete parts of the paving were found beneath

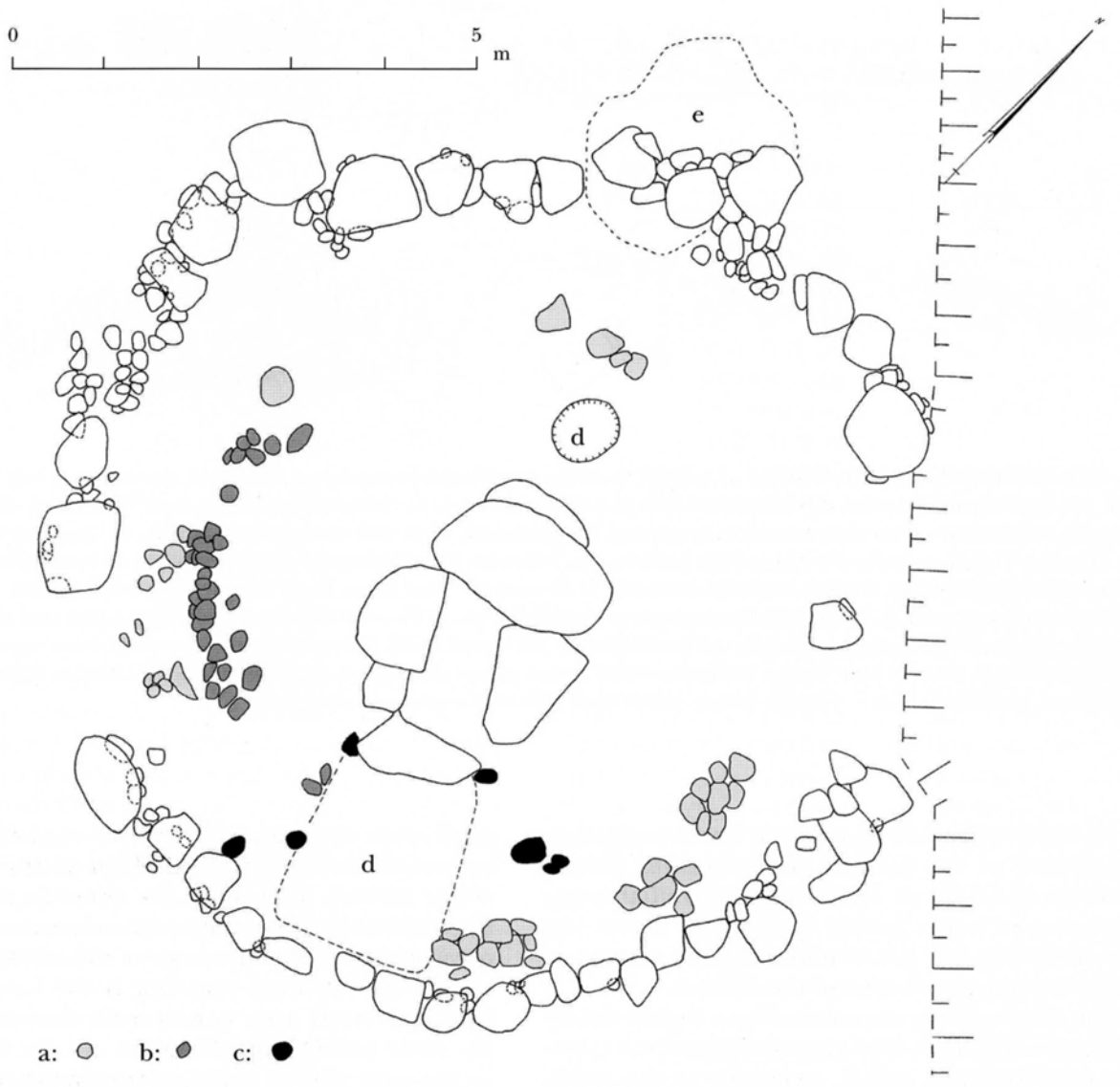


Fig. 5. Plan of the dolmen: a) Remnants of stone paving; b) Stone wall in front of mound stage 1; c)Red burnt clay; d) Pits. e) Layer of burnt flint.

regular stone paving were uncovered (Fig. 6). It extended up to 2.0 m from the kerbstones, and traces of a paving were found all around the dolmen, varying in character and extension. It is again difficult to assess if the paving was once uniform and continuous all the way around the dolmen, but it is worth noting that the most complete parts of the paving were found beneath the layers of fill eroded down from the mound. Consequently, it is probable that the parts of the paving that were lying open until the dolmen was covered by a turf mound in the early Bronze Age have, to some extent, been destroyed.

Other features

Apart from the traces of burning inside the chamber, indications of activities involving fire were also documented in several other places during the

excavation of the dolmen.

Southeast of the chamber, encapsulated in the fill of the initial stage of the mound, a 30 x 60 cm large area was burned red, but there was no charcoal, which indicates that the area had been carefully cleaned. Similar traces of fire were found at the entrance to the chamber on either side of the entrance stone. On the western side of the entrance, a red-burned area was encapsulated in the clay of the initial stage of the mound (Fig. 4f, fill f.). Charcoal was found in a concentration beside the red-burned area, whereas the red-burned area itself was totally free of charcoal. On the eastern side of the chamber, another red-burned area encapsulated in fill f was uncovered, but there was no charcoal associated with this feature. The stratigraphical position indicates that all three firing incidences must have occurred while the initial stage of the mound was under construction.

There were also traces of fire in front of the initial mound stage (Fig. 5c). Here, two red-burned areas 20 cm in diameter were uncovered. They contained charcoal and thus, contrary to the fireplaces in the mound fill, had not been cleaned. Their position immediately in front of the initial mound stage, inside the kerbstones, indicates that they belong to activities taking place after the completion of the initial mound stage but before the construction of the second stage, which covered them.

The firing activities are probably related to other types of ritual activities known from megalithic tombs. They are found south of the chamber, in front of the chamber, where ritual depositions normally are focused, and the ritual importance of firing in the TRB-burial custom is well documented in connection with both megalithic and non-megalithic chambers (Hoika 1990). At causewayed enclosures too, activities involving fire are often interpreted ritually, and of special interest in connection with the dolmen at Tårup, are the indications that fireplaces in system ditches were quickly covered by soil when the ditches were refilled (Andersen 1997, 49).

North of the chamber, partly covered by the kerbstones and the outer stone paving a 2 x 2 m large irregular concentration of burnt flint and charcoal was uncovered (Fig. 5e). The greater part of the flint was burned completely white, but contrary to the flint inside the chamber, the concentration outside also contained only slightly burned flint, and the variation in size was considerably larger, with many heavier pieces. In this way the concentration of burnt flint north of the chamber does not seem to have been subject to the same careful selection as the flint of the chamber floor. A possible explanation could be that the concentration outside the chamber represents the production site of the white burnt flint used in the chamber. The amounts of charcoal were, however, relatively limited, and the soil had not been burned red, so it is not entirely impossible that the concentration can be seen as a sort of deposition.

Fig. 6. Dolmen chamber and kerbstones seen from northwest.

Both kerbstones and outer stone paving had been put down immediately on top of the concentration of burnt flint, without any fill in between. This might indicate that only a relatively limited period of time separated the different features.

Finally, a large, 2.0 x 1.5 m large pit in the mound of the dolmen in front of the chamber should be mentioned (Fig. 5d). It had been dug through both the inner and outer phases of the mound, and was superimposed by the secondary burial D, which probably dates to the Late Neolithic or the Early Bronze Age. The pit contained no artefacts, but large amounts of charcoal were found at the bottom, indicating that some activity had taken place here before the pit was refilled. The function of the pit is uncertain, and chronologically it cannot be placed more precisely than somewhere between the finished construction of the mound of the dolmen and the horizon of secondary burials at the end of the Neolithic.

Ceramics

A very fragmented ceramic material, consisting of 309 sherds, was found in front of the kerbstones and in the stone packing of the mound. 72 sherds were decorated. Due to the fragmentation, it was only possible to reconstruct the vessels to a limited degree.

Ca. 20 plain sherds found in different places in the mound fill constitute the stratigraphically oldest material. The sherds represent at least one funnel-necked beaker, but due to the fragmentation and lack of decoration, the material can only be dated to the first half of TRB-culture. The sherds were probably brought in with the soil used for building the mound. As the texture of the mound was very similar to the subsoil, it is possible that the sherds originate from the same settlement that had left the cultural layer and the pit under the dolmen.

By far the majority of the sherds were found south of the dolmen, in front of the kerbstones on and between the stones of the outer paving. Besides a large number of plain sherds, remains of a funnel-necked beaker and two vessels of unknown form with vertical incised lines on the belly were recovered (Fig. 7 a-c). Another vessel seems to have had a combination of thin vertical lines of whipped cord and vertical incised lines on the belly. Finally, a few sherds, most probably from a pedestal bowl with nail impressions flanked by zig-zag lines, were found in this area.

East of the dolmen, immediately in front of the kerbstones, within a 0.5 m^2 large area, parts of a small funnel-necked beaker with vertical incised lines on the belly were recovered (Fig. 7 h-i). The vessel had had a height of at approximately 5 cm, and a diameter of 10 cm. North-north-west of the dolmen, also in front of the kerbstones, lay a few sherds from a vessel with vertical incised lines on the belly.

Of the vessels in front of the kerbstones, the supposed pedestal bowl with nail impressions can be dated to MNA I, and probably to an early part of this period (Gebauer 1979). The other vessels can only be dated generally within the period from late EN to MNA I.

On the surface of the dolmen and partly between the stones of the cairn-like stone cover, several sherds from a pedestal bowl were found within a 2 m^2 large area north of the chamber (Fig. 7 d-g). The bowl was ornamented below the rim with fine vertical stamp-

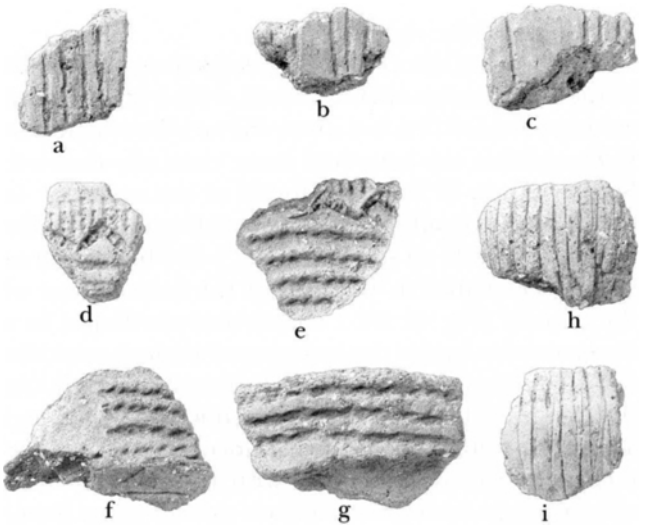


Fig. 7. A selection of the TRB pottery associated with the dolmen. a-c) Sherds from an unidentifiable vessel type found south of the dolmen in front of the kerb stones. d-g) Sherds from a pedestal bowl found on top of the cairn-like stone cover of the dolmen north of the chamber. h-i) Sherds from a funnel necked beaker found east of the chamber in front of the kerb stones. All in 1:2. Digital photo: Jørgen Holm.

lines followed by a horizontal zig-zag line made with tooth-stamp. Below that, the body of the pedestal bowl was covered by horizontal lines made with twisted cord and broken by at least one blank area. In the handle zone the vessel had vertical patterns made with tooth-stamp.

The pedestal bowl was probably deposited on the surface of the dolmen shortly after the construction of the cairn-like stone cover, as the sherds between the stones showed that the space between the stones had not been filled up with soil. The vessel can be dated to MNA I, which in this way serves as at least a terminus ante quem date of the second mound stage.

All the vessels in front of the kerbstones and the pedestal bowl on top of the dolmen must be considered deliberate depositions. There does not seem to have been any significant cleaning of the chamber, as no sherds were found immediately outside the chamber opening. Sherds belonging to the same vessel were generally lying close together, and there was no indication that parts of the same vessel had been deposited in different places. However, the fragmentation of the ceramic material was remarkably high, and despite a very thorough excavation and ideal conditions of preservation, with

a covering turf mound from the Early Bronze Age, only minor parts of the individual vessels were recovered. Consequently, parts of the vessels have been removed, either after a deliberate or accidental destruction of the vessels, or only broken parts of the vessels have been deposited.

The depositions were concentrated on the southern front of the dolmen, as is normal for ritual depositions at Scandinavian megalithic tombs, but a few concentrations of sherds broke this pattern. Most interesting is the pedestal bowl on top of the stone cover north of the dolmen. Normally, the surface of the mound construction would have been removed by natural attrition and ploughing before archaeological excavation, and depositions here would not be recognized. It has not been possible to identify chronologically different depositions; typochronologically, all the vessels might be contemporary, but of course the possibility cannot be ignored that the vessels represent several depositions.

Flint and other stones

In addition to the ceramic material, a few flint artefacts were also recovered in the mound fill. These artefacts include a transverse arrowhead, two angle burins, two flake scrapers, three pieces with retouches and three flakes from polished flint artefacts, of which at least two originate from axes. Among the stones in the cairn-like stone cover, fragments of three quern stones were found. These finds underline the impression that the building materials of the mound were collected near a settlement area.

Secondary Burials

In the chamber, dug into the mound, or added as extension to the kerbstones, six secondary burials dating to the Jutish Single Grave Culture, the Late Neolithic and the Early Bronze Age were uncovered during the excavation.

Grave A

As mentioned above, artefacts from one or more Single Grave Culture burials were found at the bottom of the chamber, directly on the original floor of charcoal and burned flint (Fig. 8a). The artefacts were a flint axe, a battle-axe and two straight-sided beakers. There were no skeletal remains.

The flint axe was partially polished on the broad sides and with hollow-ground edge (Fig. 8b). The battle-axe can be classified as of Glob type K4 (Glob 1945) (Fig. 8e). The largest of the two straight-sided beakers had a height of 16 cm and a diameter of 11 cm at the bottom and 14 cm at the mouth (Fig. 8d). It was ornamented with horizontal lines and broad zig-zag bands made with tooth-stamp impressions. The smaller straight-sided beaker had a height of 10 cm and a diameter of 10 cm, and also had an ornamentation of vertical lines and broad zig-zag bands made with tooth-stamp impressions (Fig. 8c). Finally, a small 3 cm long three-sided tanged arrowhead of flint, broken at both ends, was recovered during flotation of the floor layer of the chamber. Its affiliation to the Single Grave Culture burial in the chamber is uncertain.

Both the battle-axe and the straight-sided beakers unambiguously point to a date within the upper grave period (Glob 1945, Hvass 1986), whereas the flint axe can be dated to the Single Grave Culture or Late Neolithic only.

The battle-axe was found in the middle of the eastern side of the chamber, while the two beakers and the flint axe had all originally been placed in the northern end of the chamber (Fig. 8a). The large beakers had been broken, and a few sherds from them were spread out over the northern and eastern parts of the chamber. It is difficult to say from the distribution of the finds whether the artefacts represent one or two burials, but the closely related ornamentation of the two beakers might indicate that at least these two artefacts belong to the same burial.

Fig. 8. Finds from the Single Grave Culture burial in the chamber. a) Location of the finds. Letters refer to the sub-numbers in this figure. Sherds from pot d was found over a larger area. The other artefacts were complete. b) Flint axe with hollow-ground edge. c) Small straight sided beaker with tooth-stamp decoration. d) Large straight sided beaker with tooth-stamp decoration. e) Battle axe. All in 1:2. Drawing of the flint axe: Louise Hilmar. Digital photo of the other artefacts: Jørgen Holm.

Grave B

The Single Grave Culture burial broke the seal of the chamber, and it does not seem to have been re-established fully after the burial, as a thick layer of washed-in soil covered the artefacts of the Single Grave Culture. On top of this soil, a small coffin-shaped stone

Fig. 9. Plan of the location of the secondary burials in the dolmen mound and the cairn-like stone cover.

setting 1.3 m long and 0.6 m wide, made of head-sized fieldstones was uncovered.

The setting contained no artefacts. Based on the burial type, the grave can, with some uncertainty, be dated to the Late Neolithic. Stratigraphically, the burial superimposes the Upper Grave period burial in the chamber and is itself superimposed by the Early Bronze Age burial, F.

It seems likely that it was in connection with the construction of grave B that the capstone of the megalithic chamber was removed, as grave B exactly fills out the part of the chamber that was covered by the capstone. In any case, the capstone was definitely gone when grave F was constructed.

Grave C

North of the chamber, a rectangular pit, 3.5 x 1.2 m, and oriented WSW-ENE, was observed (Fig. 4 fill p, Fig. 9). It lay beneath a collapsed packing of stones somewhat smaller than the stones of the surrounding cairn-like cover of the dolmen. The burial pit had vertical sides and a rounded floor. In the middle of the floor, two parallel, approximately 1 m long, thin lines of charcoal were found. They did not seem to be part of a coffin and their function is unknown. The only probable remains of a wooden covering were found immediately under the stone cover in the form of a thin humus layer.

In the eastern end of the burial pit a small 5-6 cm tall and 8 cm wide, irregularly shaped ceramic vessel (Fig. 10a) was found, together with a concentration of humus, which was interpreted as the remains of a wood vessel. The ceramic pot can most probably be dated to the Late Neolithic.

Grave D

South of the chamber, an oval stone packing 3.0 x 1.5 m oriented WSW-ENE was revealed as the surface of the dolmen was uncovered. The stone packing covered a low pit with no traces of either coffin, a buried person, or grave goods (Fig. 4 fill n, Fig. 9). Due to the location of the pit, in line with the grave B, E and F, the orientation of the structure, which also corresponds with the orientation of the other burials, and the stone cover, which is identical to the stone cover of burial C and F, feature D should also be considered a burial, and possibly with a dating close to the other secondary burials in the mound.

Grave E

South of the dolmen, an approximately 2.2 x 1.0 m pit had been dug through the eroded fill in front of the mound (Fig. 9). A coffin-shaped stone setting without capstones had been constructed at the bottom of the pit, using the kerbstones of the dolmen for its northern long side. The inner dimensions of the coffin were 1.8 x 0.6 m with a WSW-ENE orientation.

The coffin contained a ceramic vessel (Fig. 10b) and the vague traces of a body placed in extended position with the head towards the west. The beaker should most probably be dated to the Late Neolithic

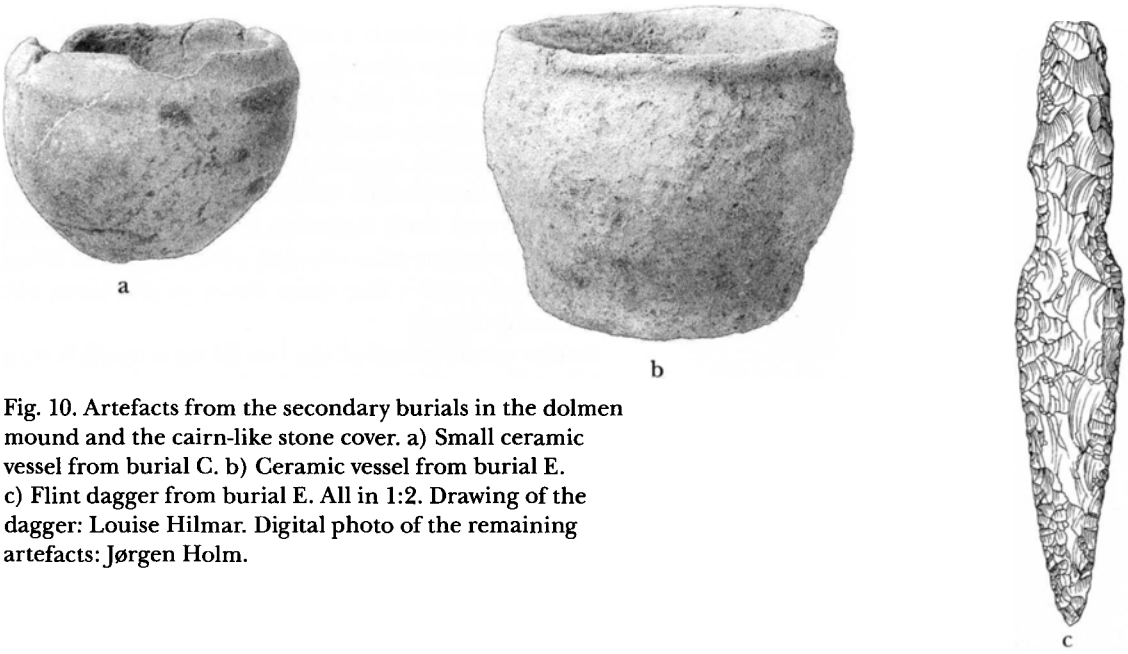


Fig. 10. Artefacts from the secondary burials in the dolmen mound and the cairn-like stone cover. a) Small ceramic vessel from burial C. b) Ceramic vessel from burial E. c) Flint dagger from burial E. All in 1:2. Drawing of the dagger: Louise Hilmar. Digital photo of the remaining artefacts: Jørgen Holm.

(See also Simonsen, this volume Fig. 21).

Grave F

Above the chamber where the capstone had once been, a WSW-ENE-oriented burial was excavated. The burial was covered by a stone packing measuring 2.5 x 1.5 m. The pit underneath the stone packing was only 15-20 cm deep (Fig. 4 fill o, Fig. 9).

In the middle of the burial a 16 cm long, combined flint dagger and strike-a-light was found. The dagger had traces of resharpening and must be classified as a type VI dagger, which dates the burial to Early Bronze Age period I or II (Lomborg 1973) (Fig. 10c).

THE COVERING BURIAL MOUND

Probably in connection with one of the secondary burials, a burial mound, 15 m in diameter and constructed of sods was erected over the dolmen. The burial mound was preserved to a height of 1.4 m, but nevertheless, over the central parts of the dolmen, ploughing had reached the dolmen surface, so that stratigraphical relations between the secondary burials in the dolmen and the covering burial mound could no longer be determined. Still, the fact that all the secondary burials outside of the chamber were in line, that they had identical orientation, and that they respected each other indicate that the mound can only have been erected after all the secondary burials had been constructed.

The burial mound covering the dolmen was itself incorporated in a later monument. That took place when the 57 m-wide burial mound with the surrounding 1.5 m deep ditch was constructed. The primary burial had been removed by construction work before the archaeological excavation was initiated, but ceramic material found in the surrounding ditch dated the mound to period I or II of the Early Bronze Age (according to Rasmussen 1993). This also means that in relative chronological terms, the construction of the large burial mound is close to the last secondary burial in the dolmen, which was also dated to period I or II of the Bronze Age. Notwithstanding that in this way there is a temporal continuity in the use of the Tårup site as a burial ground, the dramatic change in the character of the monument still seems to indicate some sort of break in tradition.

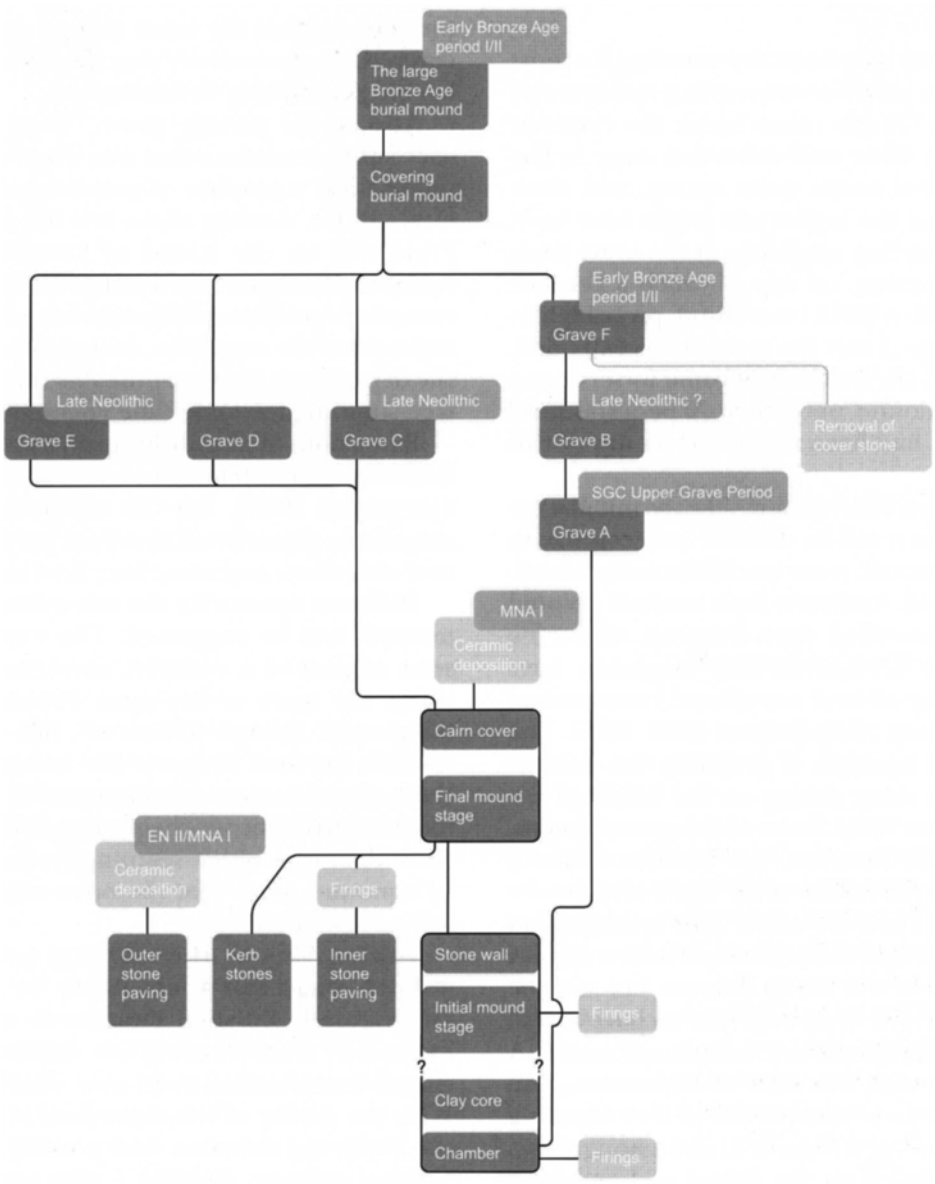


Fig. 11. Schematic representation of the interpretation of the history of the Tårup dolmen. Thick lines indicate stratigraphic relations, while thin lines indicate other observations with relative chronological significance. Also included in the graph are the stratigraphic position of the datable artefacts.

Discussion

The find material of the Tårup dolmen is relatively modest, and there were no traces of the primary burial in the chamber. The most interesting aspect is consequently the construction sequence of the dolmen and the traces of its secondary use, which, due to fortunate preservation conditions, can be described in unusual detail.

The interpretation of the history of the Tårup dolmen is summarized schematically in Figure 11. The illustration shows a relatively complex construction sequence, with two mound stages, each delimited by stone structures, and with ritual activities involving

firings accompanying the construction of the mound.

The chamber may have been free-standing for some time, but there are no observations that indisputably demonstrate this. On the other hand, the evidence of a small, initial, stone wall-delimited stage in the mound construction seems quite strong, and there are indications that the kerbstones might have been erected as free-standing megaliths at the same time. The outer stone paving, on top of which a ceramic material from EN II or MNA I was found, probably also belongs to this stage. Later the mound was extended, and only then did the kerbstones come to serve as a marking of the mound periphery. A pedestal bowl datable to MNA I had been deposited on top of this stage.

Even though open constructions like the initial stage of the Tårup dolmen will be difficult to recognize in archaeological material, some parallels can be found. P. Eriksen and N. H. Andersen have recently pointed out a number of so-called open dolmens, where the chamber and the kerbstones may originally have been free- standing without any mound construction (Andersen & Eriksen 1996; Eriksen 1996, 72ff.). The best documented example is probably the dolmen at Tustrup, with a stone paving on the inside of the kerbstones (Kjærum 1955). Some of the open dolmens, among them Poskær Stenhus, have had two circles of kerbstones, where the stones of the inner circles were somewhat smaller than the outer. This arrangement of the kerbstones might reflect a construction similar to the initial stage of the Tårup dolmen, but as none of these structures have been subject to archaeological excavations, the interpretation remains uncertain. A few long barrows with two rows of kerbstones, and where the outer row is interpreted as free standing megaliths have also been recorded, and among these, the Tryggelev-dolmen on the island of Langeland and the Bygholm Nørremark long barrow have been subject to archaeological excavation (Eriksen 1999, 22ff; Raben 1944, 210f.; Aner 1963, 32ff., Skaarup 1980; Rønne 1979).

An archaeologically-examined, seemingly close parallel to the Tårup dolmen is the dolmen at Vester Vedsted (Ebbesen 1979). The dolmen consisted of a 7-8 m wide core with a stone cover and a footing of somewhat larger stones. The core was covered by a 17-18 m wide mound delimited by kerbstones. The chamber had a covered stone passage which continued into the kerbstone construction. This means that the extension of the mound was either planned from the start, so that the inner mound stage was quickly covered, or alternatively that the kerbstones had also been free-standing in this mound.

Also, at the passage grave, "Kong Svends Høj", a very similar construction was observed, and in the publication a number of parallels are listed (Dehn et al. 1995). Among these are the long dolmen at Frellesvig on the island of Langeland. Here the extension has been dated within MNA I, based on the ceramic depositions which were found both in front of and behind the megaliths. As the kerbstones separated the depositions, it seems probable that they have been free-standing for some time (Berg 1974).

Extensions of megalithic graves are quite common in connection with the construction of a new chamber (Jørgensen 1988), but the extensions of the open megalithic graves listed above are not accompanied by new chambers, and must have another explanation.

Different reasons for the extensions of the dolmen mounds can be suggested. The extensions can be seen as part of a complex construction sequence, where the more or less open dolmen only marks a temporary, though deliberate, halt in progression towards the final design of the monument, in which the kerbstones were incorporated in the mound, as intended from the very beginning. Still, the numerous open dolmens, which seemingly were never covered by a mound, show that the open construction often was a finished design.

Taking this as the starting point, the open dolmen stage can alternatively be interpreted as an originally finished monument which was later extended, transforming the dolmen into a more closed construction to fit new ritual prescriptions. With the dating of the extensions of the Tårup and the Frellesvig dolmens, and possibly also the Vester Vedsted dolmen, to MNA I, this would correspond well chronologically with the general development towards the more closed megalithic constructions of the passage graves, but it is to some degree opposed by the extensions also being recorded at the passage grave, "Kong Svends Høj".

Regardless of what explanation is preferred, the extensions of the dolmen mounds underline that the mound construction served as an integrated part of ritual activities, which is also supported by the traces of the firings encapsulated in the mound fill. The construction of the mound and its finished design seem to have had a meaning. In this way the mound

construction can also be seen as a little-noticed source of information on the ritual activities of the TRB-culture, and instead of the impression of continuity and tradition which might arise from study of the repeated depositions in front of the megalithic burials and the repeated burials within the chambers, the mound construction invites the study of change.

Translation: John Hines

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References

Aner, E. 1963: Die Stellung der Dolmen Schleswig-Holsteins in der nordischen Megalitkultur. *Offa* 20, pp. 9-38.

Andersen, N. H. 1997: *The Sarup Enclosures. Sarup vol. 1.* Aarhus. Jutland Archaeological Society Publications.

Andersen, N. H. & P. Eriksen 1996: Dysser uden høje. *Skalk* 1996 nr. 2, pp. 5-9.

Berg, H. 1974: En mellemneolitisk gravhøj med to pæreformede dyssekamre. *Fynske Minder* 1974, pp. 49-70.

Breuning-Madsen, H. & M. K. Holst 1995: Genesis of Iron Pans in Bronze Age Mounds in Denmark. *Journal of Danish Archaeology* 11, 1992-93, pp. 80-86.

Dehn, T., S. Hansen & F. Kaul 1995: *Kong Svends Høj. Restaureringer og undersøgelser på Lolland 1991.* Stenaldergrave i Danmark, Bd.1.

Ebbesen, K. 1979: *Stordyssen i Vedsted. Studier over tragtbægerkulturen i Sønderjylland.* Arkæologiske Studier, vol. VI.

Eriksen, P. 1999: *Poskær Stenhus. Myter og Virkelighed.* Århus. Moesgård Museum.Jordenede

Gebauer, A. B. 1979: Mellemneolitisk tragtbægerkultur i Sydvestjylland. En analyse af keramikken. *Kuml* 1978, pp. 117-157.

Glob, P. V. 1945: Studier over den jyske Enkeltgravskultur. *Aarbøger for Nordisk Oldkyndighed og Historie,* 1944.

Hansen, S. 1993: *Jættestuer i Danmark.* København, Skov- og Naturstyrelsen.

Hoika, J. 1990: Megalithic graves in the funnel beaker culture of Schleswig-Holstein. *Przeglad Archeologiczny* 37, pp. 53-119.

Hvass, L. 1986: Enkeltgravskulturens regionalgrupper

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Birch bark in Danish passage graves

by Torben Dehn and Svend Illum Hansen

ABSTRACT

Birch bark has so far been observed in passage graves at eight localities. It appears that the bark had originally lain between all the slabs of the dry walling and the intermediary layer of the chamber; it was folded double, forming two layers, with the fold facing in towards the grave chamber. As the bark was put in place during erection it provides an opportunity for dating the construction. Radiocarbon dates have been obtained for one sample from each of the seven megalithic graves. The graves have an even geographical distribution and as a group they show no constructional divergences from other passage graves. Similarly, the standard of the construction is not exceptional, although two or three of them do have a chamber which is higher than is normal. It is presumed that birch bark was commonly used and was an important element in passage graves, apart from in certain areas where chalk mass was used as a kind of mortar. It is suggested that both the bark and the chalk mass functioned partly as a sealant, partly as a shock absorbent to prevent the slabs breaking during construction. Furthermore, the possibility cannot be excluded that an ornamental effect was also intended. The radiocarbon dates, with one exception, date the passage graves to the Middle Neolithic, but a technological development in the construction cannot be demonstrated. The occurrence of birch at this time is confirmed by pollen analysis. The optimal conditions for preservation of bark in the megalithic graves appear to be that the chamber must have been free of soil since antiquity and that there are large quantities of crushed flint behind the dry walling such that air could circulate around the bark.

INTRODUCTION

One normally associates megalithic graves with large quantities of earth and massive stones weighing many tons, but other materials such as wood were also important elements during construction and in the finished structure. One of the few lines of evidence in this respect is the occurrence of birch bark. This phenomenon was described in the 19th century in connection with the opening of the chambers of two passage graves. In 1823 and 1890 bark was discovered between the slabs of the dry walling which occupy the gaps between the individual orthostats. These early observations have made their mark in twentieth century research solely in connection with Poul Kjærum's investigations of Jordhøj at Mariager, where a radiocarbon date was obtained for bark from the site (Kjærum 1970). As part of the intensification of the National Cultural Heritage Agency and the National Museum's work with the maintenance and restoration of the most frequently visited scheduled megalithic graves a sharp watch was kept for further occurrences. So far in the 1990s a further five localities have been found with bark preserved to very varying degrees. This brings the total of known localities up to eight. As so often previously in the history of archaeology it appears that once a phenomenon has been recognised it suddenly turns up in large numbers.

It seems remarkable that, especially since the advent of radiocarbon dating, greater attention has not been paid to possible other occurrences in addition to the two early examples. There are probably several explanations for the bark having gone unnoticed. Firstly, the very idea that sheets of birch bark lying open to the air for more than 5000 years could be preserved up to the present day seems on the face of it improbable. Another explanation is that where the bark is in a poor state of preservation it is very difficult to discern and to distinguish from roots and other material that lies between the dry walling slabs.

Fig. 1. The eight passage graves where bark has been found between the slabs of the dry walling.

The occurrences registered so far suggest that the bark was an integrated part of the construction of megalithic graves and that its use was quite normal. The bark was put in place during the construction of the grave chambers and provides therefore, in contrast to grave equipment and sacrificial horizons, the possibility of dating the actual construction of the burial monument. Bark has a further advantage in that its internal age is minimal. The bark is however not just interesting with regard to dating. As an important and common part of the construction, the bark contributes to an understanding of the achievement, in terms of work invested and technological expertise, of which a megalithic grave is an expression. The bark is, furthermore, part of the architecture and of the whole organisation of the interior of the burial monument – its appearance, mediated through form and colour, as it was used for its original purpose.

Maglehøj (Hellested parish sb. 3; Boye 1862) is a scheduled passage grave with a chamber and a passage, lying in a partly destroyed round barrow. The farmer opened the earth-free chamber in 1823 when he dug into the barrow. However, the local vicar followed the opening very closely and noticed among other things the bark. In his thorough report to the Commission for the Preservation of Antiquities he describes the wall of the chamber as "a stone wall, comprised of 15 flat, broadly-based and pointed-topped field stones, which touched each other at the base with the gaps above being walled up with flat stone slabs, which looked like pieces of board lying on their flat side and showing their edges. In between these stone slabs a kind of bark has been placed of which a small sample is enclosed in No. 1. The man who excavated the mound says that it is birch bark, which he as a Norwegian claims to know well." There are some artefacts from the opening of the mound in 1823, including flint daggers. These were not professionally excavated.

After the opening the mound was re-established, but in 1909 the National Museum carried out a restoration made necessary by a badger having burrowed behind some orthostats. On this occasion it was also necessary to repair some of the dry walling, particularly in the passage. In the chamber between a third and half of the dry walling has been rebuilt, while in the passage the proportion is more than half. Apart from this restoration, and a secondary intrusion through one gable later in antiquity, the chamber stands unaltered since its construction. During a combined investigation and restoration in 1996 (Rigsantikvarens Arkæologiske Sekretariat (ed.) 1997, 146, no. 125) only minor repairs were carried out. The monument is well built with a layer of stones, each 40-80 cm in thickness, between the orthostats and the capstones, supplemented with sandstone slabs of very variable size. In one corner the intermediary layer consists exclusively of up to five courses of sandstone slabs. The megalithic grave must be said to be well built with a construction that is both well known and common without being considered technically advanced. The building work was apparently carefully executed with very solid fills of crushed, unburned flint behind the walls of the chamber and, according to the description from 1823, also with a roof construction of flat slabs over the capstones within the mound.

Remains of birch bark can be seen in the dry wal-

Fig. 2. Dry walling with birch bark *in situ* in Maglehøj. In the uppermost course no bark can be seen but in the second to the fifth course from the top the fold is preserved to varying degrees. In the sixth course there is bark but the fold is missing. The section shown is 50 cm high. Photo Torben Dehn.

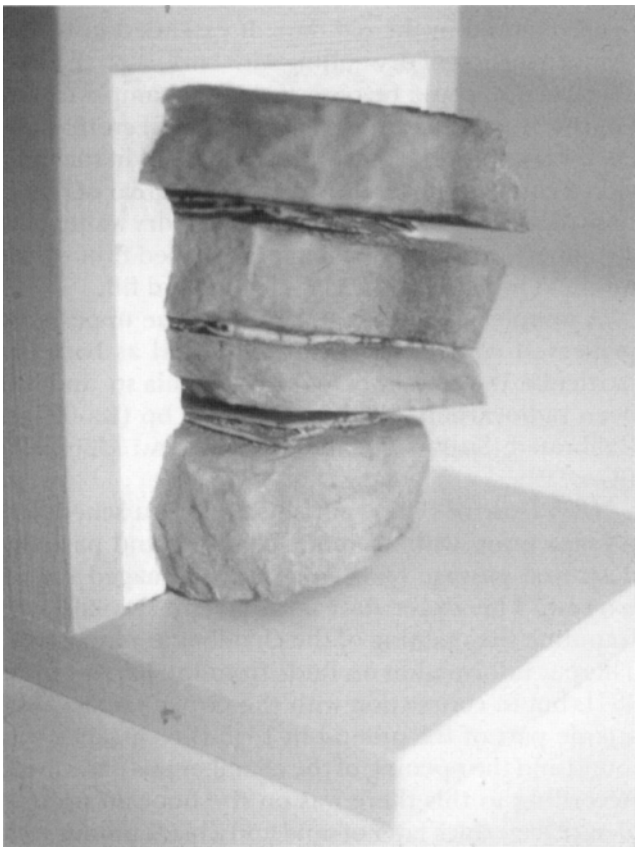

Fig. 3. During the investigations of the passage grave Maglehøj in 1996 a section of characteristic dry walling with birch bark was removed. It was immediately stabilised and later fixed in a plaster cast, which is stored at the National Museum's Conservation Department in Brede. On the picture the specimen is shown partly from the side with the front facing into the chamber to the right so that the two layers of bark and the fold can be seen. Photo Torben Dehn.

ling of the chamber and in the intermediary layer. In many places there is a double layer with a fold running parallel to and in line with the edges of the slabs facing in towards the chamber. Where the bark is best preserved it lies between all the courses in the dry walling and extends across their full breadth. Bark occurs in all the gaps in the chamber where the dry walling is intact, and it is present both at floor level and between the slabs of the intermediary layer at a level above the orthostats. Bark is preserved in a total of about 120 courses, of which there are remains of the fold in about 30, and it lies in courses that are between 4 and 80 cm long. Bark is thus found distributed throughout the whole chamber with the exception of the walls re-erected in 1909. In some places the bark is preserved despite subsidence having occurred due to slabs having fallen out. The fact that bark could not be demonstrated in the passage is probably due to no original walling being preserved here, with the exception of some of the intermediary layer and seven courses of dry walling at the base of a gap between two orthostats. During the investigation in 1996 a trench was cut through the side of the mound which had

been removed in the old days. It extended in to the rear of a section of dry walling with bark, such that the construction could be observed and a sample taken. On the rear of the dry wall it could be seen that the bark was only preserved between the slabs in the individual courses – not at the sides or to the rear of them. Immediately up against the rear of the dry walling lay a compact, earth-free packing of crushed flint which was held in place by the clay-rich mound fill.

A sample of the bark, taken from the uppermost preserved course, has been identified as bark, in particular the cork layer, of birch, Betula sp. and has been radiocarbon dated to 4440 ± 50 bp (Ka-6975). Calibrated (Stuiver *et al.* 1998) ± 1 st. dev.: 3330-2920 BC.

Ubby Dysselod (Ubby parish sb. 29) is a scheduled passage grave with an intact chamber and partially destroyed passage lying in a badly damaged round barrow. The exact date and circumstances surrounding the opening of the chamber are unknown. There is information on finds from the barrow from 1841, but in connection with the owner's removal of a large part of the mound in 1845 the entrance was found and the opening of the chamber was described. According to this there was on the floor an up to 1 alen (2 feet) thick layer of sand and a black humus-rich mass, while the remainder was earth-free (Antiquarisk Tidsskrift 1847, 223). Traces on the orthostats still show the height of the original grave fill.

This is an unusual monument with very high orthostats. At 2.4 m, the chamber is among the highest, even though it was constructed without an intermediary layer; the two capstones lie on orthostats, regulated solely by a layer of thin flat stones and slabs. The orthostats are of a size only rarely seen. Similarly they appear to have been carefully chosen for their very flat inner surfaces. Furthermore, they have been selected and placed together such that the gaps between them are minimised. Only in two or three places is there dry walling of more normal dimensions. The other gaps have been filled from the rear with vertically placed flat slabs or closed with a small section of dry walling made of very small slabs. The passage is also unusually high. The monument appears impressive due to the quality of the stones and the careful way in which they have been fitted together, including a set of twin stones (Hansen 1993; Dehn *et al.* 1995, 55ff.). Apart from the size of the stones, the construction of the chamber itself does not appear technically unusual or challenging. The unusual composition of the passage and chamber suggests, on the other hand, a certain technical superiority. From the chamber it is possible, through the gaps, to see the earth-free packing of crushed unburned flint behind the orthostats and gaps. Looking up between the capstones a covering of flat stones can be perceived. Together with details such as the small units of dry walling between the capstones and so on, this gives the monument a mark of precision. It is striking that another scheduled passage grave, lying a mere 70 metres away, has a completely identical ground plan and correspondence with regard to the use of certain characteristic materials, but constructionally it is quite ordinary and of an ordinary height (Grønnehøj sb. 26; Dehn *et al.* 2000, 30).

Artefacts were found in connection both during the removal of part of the mound and the later opening of the chamber; in the mound there were, among other

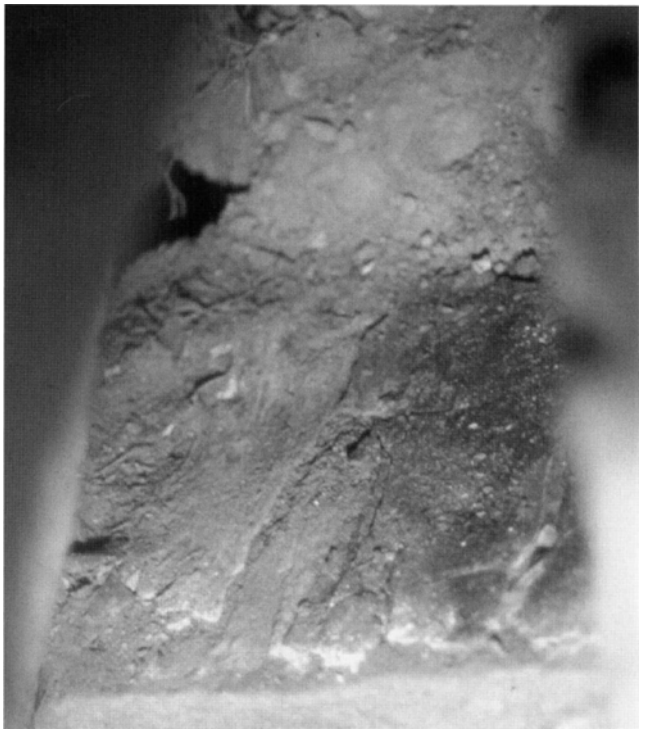

Fig. 4. Birch bark in the passage grave Ubby Dysselod. The picture was taken looking from the chamber in between two orthostats. The uppermost preserved slab has been removed so that the bark can be seen lying on the next slab below. The fold along the front edge of the slab has disappeared and the two layers of bark can no longer be separated. Photo Torben Dehn.

things, secondary Bronze Age graves. In the chamber itself, flint tools and three pots as well as a cranium and some thighbones lay on top of the grave fill. In the passage there were similarly human bones and flint tools. None of the antiquities has been incorporated into museum collections despite the fact that the farmer later offered to sell them.

In connection with the restoration in 1997 of the two passage graves Grønnehøj and Ubby Dysselod, preserved bark was discovered in one of the dry walling sections in the chamber at the latter (Rigsantikvarens Arkæologiske sekretariat (ed.) 1998, 121, no. 103). Between all the preserved slabs lying on a 0.6 m high solestone, bark was preserved in eight courses, in some cases as sheets extending the full length and at one place in particular with a completely intact fold facing in towards the chamber. Bark also lay between the solestone and the lowest course of slabs. A sample was taken by removing a slab from the uppermost course and it could be clearly seen that there were two layers of bark and that these lay with their fibres at right angles to the long axis of the dry walling slabs. The bark, of which a sample was taken, completely covered the underlying slab.

The sample was identified as birch, Betula sp. and has been radiocarbon dated to 4475 ± 45 bp (Ka 6978). Calibrated (Stuiver *et al.* 1998) ± 1 st. dev.: 3340-3030 BC.

Olshøj (or *Onshøj*) is a scheduled round barrow containing two passage graves; the chambers are not integrated in their construction (Rørby parish sb. 12; Dehn *et al.* 2000, 157ff.). The mound was opened in the 1850s, at which time stones were revealed, but it was first in 1871, during excavation by the owner, that the two chambers were found. The only source of information is a newspaper article, according to which a number of potsherds were found. An antiquarian description was first carried out in 1881 and by then some kerbstones and the outer part of the passages had been removed in connection with house construction. Much of the earthen mound had been dug away and the capstones, for example, lay exposed for many years. Through two large restoration projects in 1900 and 1937 the mound was re-established and the derelict dry walling rebuilt. In 1988 it was again necessary to restore a number of sections of dry walling.

Both chambers are well built with a solid intermediary layer comprising one course of substantial stones. The preserved parts of the dry walling comprise carefully shaped sandstone slabs. The monument lies in an area with many double-chambered passage graves and distinguishes itself from some of them only in that the two chambers are not integrated in their construction. Olshøj is characterised by having a large number of high solestones in the dry walling. However, apart from this Olshøj's construction and execution does not distinguish itself from that which is the norm for the area. During the restoration in 1988 it was possible, from the chamber, to observe the mound construction immediately behind the gaps between the orthostats; an earth-free packing of crushed unburned flint bound by clay could be seen.

In the westernmost of the two chambers there are, in the lowest part of a section of dry walling, five courses where a little bark is preserved. This comprises, however, exclusively loose fragments in a poor state of preservation. Furthermore, as the conditions for observation are difficult, nothing can be said with regard to extent of the bark or to the possible presence of folds, only that there appear to have been two layers.

A sample from Olshøj has been identified as birch, Betula sp., and has been radiocarbon dated to 4245 ± 40 bp (AAR 5472). Calibrated (Stuiver *et al.* 1998) ± 1 st. dev.: 2910-2710 BC.

Rævehøj, Dalby is a scheduled passage grave in a round barrow (Kirke Helsinge parish sb. 26). The passage grave was discovered in 1852 when digging a fox out of the mound. On this occasion the south gable of the chamber was opened and a number of finds from the Stone Age and Bronze Age were recovered. As a direct consequence of the opening, one end of the southernmost capstone fell down into the chamber. In the course of the subsequent decades the latter became almost totally filled with earth. During restoration and investigations carried out by G. Rosenberg of the National Museum in 1932, the capstone was restored to its original position and the hole resulting from the opening in 1852 was filled in. The chamber was also emptied of the earth, which had fallen in, and subsequently investigated. The passage, which contained skeletons, was similarly excavated and opened. In connection with this Bronze Age graves were found partly over the passage and in the entrance area. A further investigation in connection with the restoration in 1997 (Rigsantikvarens Arkæologiske Sekretariat (ed.) 1998, 121, no. 106) showed that the kerbstones and outermost part of the passage had been disturbed by a grave at this point, and that the Stone Age mound had been extended. During the

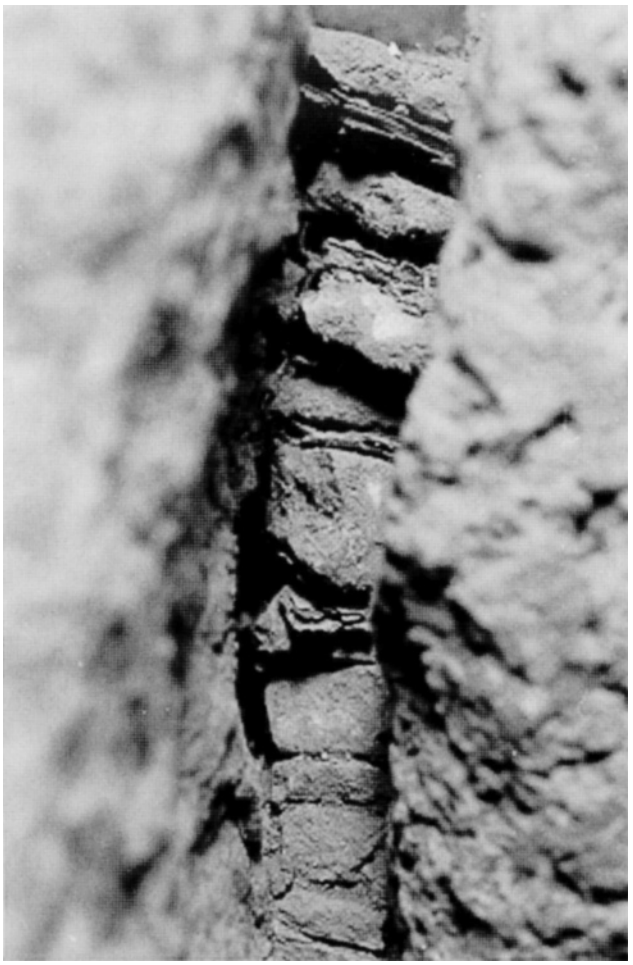

Fig. 5. Birch bark in the passage grave Rævehøj. Between the only 2-4 cm broad slabs in the five uppermost courses between two orthostats the bark can be seen as several layers of thin flakes. In the second lowest course a piece with a fold is preserved. Photo Torben Dehn.

excavation in 1932 there were rich finds of ceramics from the Funnel Beaker culture (Ebbesen 1975, Find list A no. 60, Figs. 39,1; 86,5 and 201,4, Note 176, 231, 272, 297, 304, 336 and 372).

Apart from the limited disturbances during the Bronze Age and the opening in 1852, the passage grave appears to be relatively intact. Only a few limited repairs have been carried out since 1932. The chamber, with a height of 2.5 m, is among one of the highest in the country. The chamber, by virtue of its construction, is seen as being one of the more technically complicated examples of Danish megalithic architecture. The individual stones are of a normal size for passage graves, but the five capstones lie on three layers of stones that have been inserted as an intermediary layer above the orthostats. The intermediary layer comprises two thin (10-30 cm) layers lying respectively over and under a layer of larger stones c. 60-70 cm in thickness. The two thin layers comprise flat stones or slabs which have the function of evening out the differences between the orthostats, the central intermediary layer and the capstones. The orthostats have, as is normally the case, an inwardly-leaning posture and the stones of the intermediary layer are, furthermore, slightly displaced inwards so the breadth of the chamber is reduced vertically. The length of the capstones is such that their extremities rest on the upper course of stones in the intermediary layer, i.e. they are so short that they could lie at floor level without their ends touching the orthostats. The intermediary layer forms a kind of vault – a construction that demonstrates technical superiority. Firstly, the length of the capstones is exploited to the limits and, in so far as these were chosen in advance, the builders had, already when determining the dimensions of the monument at ground level, calculated very precisely how broad and how long the chamber was to be at roof height. Secondly, the actual positioning of the five capstones on top of the three courses of intermediary stones is an unusual display of craftsmanship.

The dry walling has suffered heavy deterioration, but that which remains suggests very careful construction. The slabs used are either of sandstone or claystone, relatively thin and very well fitted. Small openings in the intermediary layer appear to have been filled up with small sections of dry walling. Both in the openings in the intermediary layer and between the orthostats a solid packing of crushed unburned flint could be seen.

A small section of wall in a narrow gap between the orthostats in the south-eastern corner of the chamber was an example of the care that had been exercised in building the dry walling. Often such gaps are seen filled up with larger slabs placed vertically, but here there were 12 courses of slabs preserved, each measuring no more than 2-4 cm in each direction. In eight of the courses there were still two layers of birch bark present and in two places a fold could be demonstrated. The section of dry walling with bark was not exactly in place between the two stones but had been pushed a little to the rear. The small slabs lay therefore irregularly and the bark was no longer

under pressure from the weight of the slabs and had separated into up to four thin sheets. A sample was taken by lifting the uppermost preserved slab and taking out the bark. The pieces of bark were of the same size as the slabs. Now the preserved wall and bark are not immediately visible, but sealed behind a new construction.

The sample from Rævehøj has been identified as bark, in particular the cork layer, of birch, Betula sp and has been radiocarbon dated to 4540 ± 45 bp (Ka-7000). Calibrated (Stuiver *et al.* 1998) ± 1 st. dev.: 3360-3100 BC.

Jordhøj is a scheduled passage grave in a round barrow (Mariager rural parish sb. 36: Kjærum 1970). The grave chamber was discovered in 1890 when the owner, out of curiosity, dug into the top of the mound. After having removed a large slab that lay between orthostat and capstone he could look into the undisturbed earth-free chamber. Directly afterwards Vilhelm Boye and Daniel Bruun of the National Museum undertook an investigation of the chamber in which the grave goods and a plank construction lay exposed on the floor. In several sections of dry walling there was bark, including in a gap in a niche: "In the southern corner a kind of niche had been formed in that there was here an opening, 31.4 cm in breadth and depth, between two sidestones. This had a rear wall of flat slabs, in between which could be seen birch bark sheets in a few places; these had been folded over and placed in such a way that the fold pointed in towards the chamber [sketch, figure 6]. This suggests that the bark sheets must have been put in place when the slabs were built up. In this niche there is a thick flat slab which has been jammed in 0.63 m over the base to form a kind of shelf". These precise measurements, 31.4 cm and 0.63 m, are presumably conversions from the old measurements fod and alen. In the section in the report on the passage it is mentioned that in "the beautifully stacked stone slabs" between the eastern corner stone and the adjacent stone in the passage there also lay "folded birch bark sheets" in the same fashion. After the investigation, the hole in the roof of the chamber and the excavated shaft in the top of the mound were filled in.

In the grave layer lay charcoal and pieces of wood; these have been subjected to analysis, as have the planks that lay in the chamber. The small fragments come from birch, pine, hazel and oak while the planks are of birch (Bahnson 1892, 199).

The so-called niche is a gap between two orthostats,

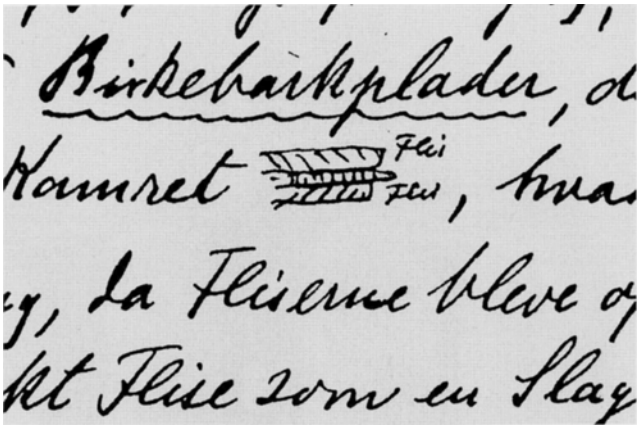

Fig. 6. In his report on the investigations at Jordhøj in 1890 Vilhelm Boye made this sketch in connection with a description of the birch bark between the dry walling slabs. The sketch shows two slabs with bark in between seen in cross-section from the side and with the chamber to the right. The rounded edge of the bark must be the fold. The two small words immediately to the right of the drawing are the Danish words for "slab". Photo Torben Dehn.

where the dry walling stands a little further recessed than in the other gaps in the chamber (Hansen 1993, 33). It is a quite common feature, especially in northern Jutland, that one or more of the dry walling sections stands markedly recessed relative to the others. Often clay vessels or crania are found in these deep recesses; this could of course be due to the fact that the artefacts here have been less subject to disturbance. However, the stone shelf in Jordhøj, along with several other examples, suggests that this constructional feature was intentional. Similarly, evidence from the floor indicates that these deep recesses or niches have had special significance. In reality the transition from these deep recesses to proper niches, which are formed by the intentional displacement of the orthostats is rather fluid; an example of such a niche is seen in Mutter Gribs Hule in northern Zealand (Dehn *et al.* 2000, 271ff.).

During a minor restoration of Jordhøj in 1910 the exposed part of the passage was re-established and two sections of dry walling in the passage and one in the rear wall of the chamber were repaired. The latter repair was presumably a restoration of the upper part of the dry walling which was removed during the opening in 1890. In 1964-65 Poul Kjærum, of Moesgård

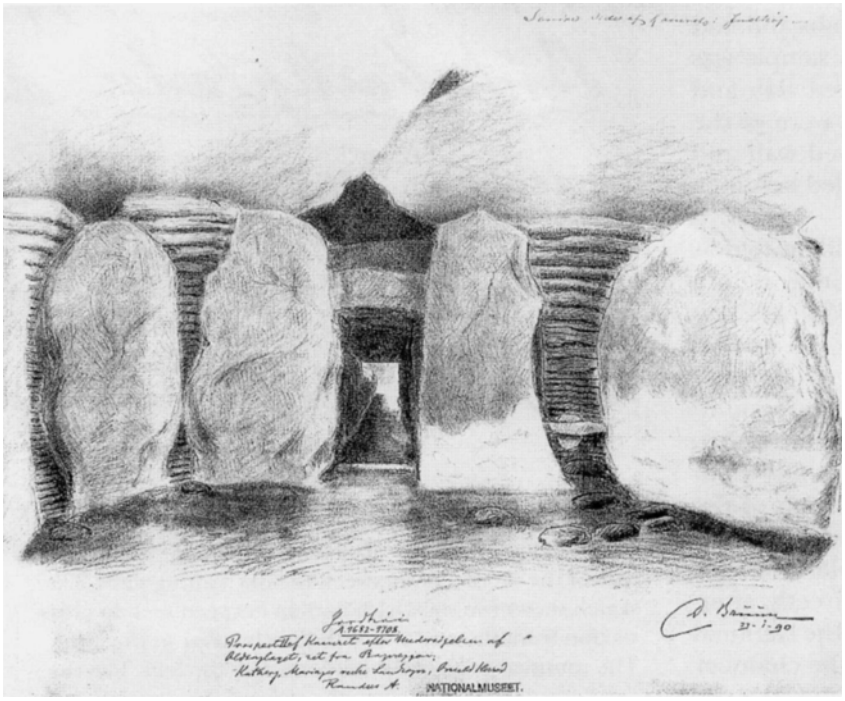

Fig. 7. One side of Jordhøj's chamber, drawn by Daniel Bruun just after the investigation of the grave layer in 1890. Most of the bark was present in the deep recess immediately to the right of the passage. Here a stone can also be seen, inserted as a shelf between the two orthostats.

Museum, carried out an investigation of the entrance with the aim of shedding some light on the question of clearance layers versus sacrificial layers in front of passage graves. At the same time the nature of the construction of the mound was established by way of an excavation field located in the side of the mound. Similarly, the kerbstone construction was exposed together with the sacrificial layer (Kjærum 1970).

During this investigation around 7000 potsherds were found in front of, and on, the facade at the passage mouth. From these sherds 44 clay vessels could be identified in various states of preservation, but the original number must have been much greater. On opening in 1890, the chamber and passage were found to contain flint daggers and clay vessels or fragments of vessels, all from the Single Grave culture or Late Neolithic (Kjærum 1970, 25ff.). The vessels connected with the facade come from the whole of the Funnel Beaker culture, spanning the period from MNIb to III. Subsequently there was activity in period V and in the Late Neolithic (Ebbesen 1985, Find list A no. 74).

The chamber and passage in Jordhøj appear now in a relatively undisturbed state. Two capstones have been placed directly on seven orthostats, just as is the case in the passage, while a large flat stone over the capstones covers the opening of the passage into the chamber. In its ground plan, form and construction the passage grave is quite usual for the area, where it lies in a close concentration of megalithic graves. Similarly, the execution of the monument does not deviate from the norm. As mentioned in Vilhelm Boye's report from 1890, bark occurs in both the passage and the chamber, partly in the innermost right hand gap in the passage seen looking from outside, partly just to the left of the mouth of the passage. Bark was found in several courses in both places; in the passage both in the upper and the lower parts. When the monument was opened in 1890, a flat stone was found jammed horizontally in the gap between the orthostats to form a shelf in the chamber just to the left of the mouth of the passage. It has been remarked upon that bark only occurred above this shelf (Hansen 1993, 53; Kjærum 1970, Fig. 6). This is however not the case; in the fourth course from the base, about 20 cm below the level at which the shelf sat, there are still remains of bark. In addition to the two cases already mentioned, there are also a few pieces of bark between two courses in a gap in the south-western corner of the chamber.

The bark in Jordhøj is in a disturbingly poor state

of preservation relative to that described in 1890. It is now only seen as loose flakes lying deep between the courses and as a partly dissolved mass where the slabs rest on one another. There are no longer preserved pieces with folds but in some places the double layer can still be observed. Behind the dry walling there are very substantial packings of fire-bleached flint. Immediately to the rear of the slabs these packings are largely earth-free, while further out into the mound there is more earth mixed in. The flint-packings behind the dry walling in passage graves normally comprises crushed unburned flint, but in eastern Jutland it is quite normal for the flint to be burnt.

In connection with the investigation in 1964-65 a sample of birch bark taken in 1890 from dry walling in the south-western corner of the chamber was submitted for radiocarbon dating (Tauber 1967, 109). It was dated to 4490 ± 120 bp (K-978). Calibrated (Stuiver *et al.* 1998) ± 1 st. dev.: 3360-3020 BC. In 1998, in order to avoid any possible inconsistencies with the new series of samples from other localities, a further sample was taken which was radiocarbon dated to 4485 ± 50 bp (Ka 7001). Calibrated (Stuiver *et al.* 1998) ± 1 st. dev.: 3340-3090 BC. There is thus good agreement between the two dates.

Hvalshøje, Iglsø (Fly parish sb. 82; Bahnson 1892, 201; Ebbesen 1978, 121ff.). One of the mounds is a scheduled round barrow containing two passage graves, which are not integrated in their construction. The name Hvalshøje (or Kokshøje) covers a group of in all four barrows, of which only one is known to contain a megalithic monument. The two passage grave chambers in the southernmost of the mounds were discovered in 1887 when the owner, by excavating a trench into the north side, struck the orthostats and capstones of one of the chambers. Subsequently, Vilhelm Boye of the National Museum undertook an investigation the same year. The two chambers lie in a primary mound with kerbstones, covered by a secondary mound. They lie close to one another but are not integrated in their construction. The northern chamber was filled up to the capstones with white sand and, just like in Jordhøj, "stripes of rotten wood" lay on the floor. Both the passage and the chamber contained the very poorly preserved remains of numerous skeletons. In the southern chamber the southern end was almost completely filled with heath soil, while the remaining part was only half-filled; the passage was filled with both sand and heath soil. In addition to several skeletons, the finds included flint blades and amber beads. The occurrence of kerbstones within the mound indicates that several phases are represented in the barrow. A fragment of a fire-damaged flint chisel lay associated with the chain of kerbstones (Ebbesen 1978, Find list A no. 35, Figs. 118-119).

Already in 1900 it was necessary for G. Rosenberg of the National Museum to carry out a restoration of the two chambers. During this numerous sections of dry walling had to be repaired by inserting new slabs and the mound itself was evened up. In 1961 Dorthe Hansen of the National Museum repaired damage arising from the activities of burrowing animals; a few sections of dry walling had also to be repaired. During a restoration in 1996, which was prompted by a fallen stone from the roof construction of the northern chamber and a badger's burrowing under the orthostats, it was again necessary to repair damage to some of the sections of dry walling. On the same occasion the chambers were re-examined (Rigsantikvarens Arkæologiske Sekretariat (ed.) 1997, 175, no. 248).

The ground plan of the two chambers shows that they are more or less identical in shape and size. The walls in the two chambers are similar in that the two corner stones in each chamber are relatively tall and that the largest stone in each chamber is the stone standing opposite the mouth of the passage. There is however one extra orthostat in the southern chamber relative to the northern chamber, because the stones in the latter are generally narrower. The two chambers differ on one point and that is the construction of the roof. While the southern chamber is covered in the usual way by two flat horizontal stones of regular shape lying beside one another, supplemented by smaller stones, the roof of the northern chamber is rather untraditional in its construction. One stone of normal capstone size covers approximately one third of the chamber, while two large and three lesser stones cover the remainder. The lower surfaces of the stones are not flat and several of the stones rest partly on one another and not exclusively on the orthostats or the intermediary layer, as is the norm. In two other double passage graves from this part of Jutland a similar technique has been used. There are several possible explanations for this unusual construction, including the lack of suitable stones or the requirement that particular stones should be included in the construction. The latter appears to be the case in the passage grave Ørnhøj in Himmerland (Dehn & Hansen 2000a).

The construction of the two structures in Hvalshøje

is in its entirety characteristic of the megalithic graves in the area, and the special roof of the northern chamber probably created problems in the construction, but does not appear to be technically advanced. The construction is an expression of a technically superior treatment of the large stones, but does not appear more superior than that seen in ordinary megalith building.

With regard to bark, Hvalshøje has the sparsest occurrence seen so far. A few small fragments less than ½ cm in size were found only in a single course in the gap between the corner stone and the first orthostat to the left of the entrance (seen from outside) in the southern chamber. In between the slabs there was very light-coloured sand. In this chamber the opportunities for observing possible packings behind the dry walling were poor, but in the northern chamber the dry walling was more derelict. Here, behind the base of the dry walling, a border of burnt stone material could be seen, while higher up there was sand and larger stones. Fire-bleached flint occurred behind a few of the sections of dry walling, but it was not possible to gain an impression of the amount.

The sample from Hvalshøje has been radiocarbon dated to 4620 ± 55 bp (Ka-6976). Calibrated (Stuiver *et al.* 1998) ± 1 st. dev.: 3520-3340 BC.

Snibhøj is a scheduled round barrow containing two passage graves that do not have an integrated construction (Snæbum parish sb. 26; Ebbesen 1978, 22ff.; Madsen 1900, 16ff.). The entrance to the northern chamber was discovered in 1895, when the owner wanted to make use of some of the kerbstones and the southern chamber was found in the same way the following year. Both chambers were free of earth on opening and were investigated by the National Museum, the first by G. Sarauw, the second by A. P. Madsen. In the northern structure, stones had been laid to form the floor of both the chamber and the passage. On these lay disarticulated bones, partly in the passage, partly in the chamber. In the middle of the latter lay also parts of a skeleton, apparently in an outstretched position, under a covering of stone slabs. The southern structure also had a stone floor on this in the passage lay two skeletons in an outstretched position. In the chamber lay the bones of at least 12 individuals; some bones lay covered by slabs and others lay freely exposed. Some bones lay disarticulated while two skeletons lay outstretched in the middle of the chamber. Not many artefacts were found in connection with the opening of the two chambers. From the northern chamber there are three blades and from the southern chamber there was one blade, an arrowhead and sherds from four clay vessels (Ebbesen 1978, Find list A no. 75, Fig. 12).

The two structures are not unusual in their construction or ground plans, but their dimensions are extraordinary and the chambers are some of the largest and best preserved in Jutland. The northern chamber is rather smaller in size and height than the southern chamber, which is almost circular in its ground plan and has orthostats exceeding 2 m in height. On these lie two capstones, of which the weight of the largest is estimated at almost 20 tons. The orthostats have a slightly forward-leaning stance such that their sides support one another like cards in a house of cards. The dry walling is well built and comprises substantial split stones of granite and gneiss. Where the orthostats are too low, they are supplemented with an intermediary layer of large stones. At the opening of the passage into the chamber the roof is formed by a triangular keystone jammed between the two corner stones so that the point extends into the chamber; above this lies another keystone. This building technique, comprising a single or double triangular keystone, is characteristic for central and northern Jutland (Hansen 1993, 46ff.). The rear wall, directly opposite the mouth of the passage, is formed by an exceedingly large and broad stone, which like a few of the other orthostats is almost triangular in shape and stands with one of its points downwards. The flint-packings behind the dry walling consist of burnt flint and are slightly mixed with mound fill.

Bark has only been demonstrated at Snibhøj in the southern chamber, where it has been found in three sections of dry walling lying adjacent to each other towards the north-west. Bark occurs sporadically in one, two and five courses respectively at a height of 43-100 cm above the floor. At one place a fold can be seen.

A sample of the bark from Snibhøj has been radiocarbon dated to 4590 ± 40 bp (AAR 5473). Calibrated (Stuiver *et al.* 1998) ± 1 st. dev.: 3500-3120 BC. An identification of the bark has not been carried out.

The occurrence of bark in passage graves

Bark in dry walling has so far been observed at a total of eight localities. Maglehøj, where the conditions for preservation have been good, is particularly informa-

tive with regard to the occurrence of bark in the construction. However, making use of the supplementary information from the seven other structures, it seems most likely that bark was used both in the passage and the chamber, and in both the dry walling and in the intermediary layer and from floor to roof. It was used between the smallest slabs measuring only 2-4 cm and between the long flat stones in the intermediary layer, which are up to 80 cm in length. The bark appears to have been used consistently in the same way; at 6-7 localities it lies in a double layer and at six of them there are, to varying degrees, the remains of a fold. In five of the chambers there is evidence showing that the bark can fill the gap extending the full length of a course and at four sites it has been seen to cover the slab across its full breadth. This could also be the case at Snibhøj, and on the basis of V. Boye's sketch figure 6 it was probably also the case in 1890 at Jordhøj, but it has not been possible to confirm this today. At seven of the localities the bark has been identified as being of birch, while no identification of the material from Snibhøj has been carried out.

The eight chambers in which bark has been recognised are constructionally very different, as is generally the case with passage graves. Some of the differences appear to be regionally determined. For example, in Jutland the capstones rest directly on the orthostats, but there can be fills, in the form of flat stones, between smaller orthostats and the capstone. The sections of dry walling are often markedly recessed relative to the line of the chamber wall, sometimes as far as the rear of the orthostats. In northern Jutland there is a characteristic keystone construction as described in the section on Snibhøj. There are also cases of chambers being eccentrically placed within the mounds; in mounds with two chambers these do not have an integrated construction. On Zealand, two chambers within the same mound normally have an integrated construction forming actual double passage graves. In these cases use is also often made of 1-3 intermediary layers of large regularly shaped stones supplemented by large slabs. On Zealand, dry walling is often seen with very high solestone and on Lolland and Falster keystones are rarely used but the capstones are laid directly on the corner stones. Such regional differences and characteristics are partly due to differences in the building materials available, but craft traditions and the various demands made by the persons instigating the building work also play a role. This also applies within the various regions, where despite general similarities in shape and form there can be differences in technical execution, both the visible part in the chamber and that hidden behind the walls. These local variations are similarly to a certain extent determined by the available materials, but the resources devoted to obtaining optimal materials must also have been important. Corresponding differences in detail in the execution of the building work can be observed in the double passage graves, where one chamber, because of the ideal materials used, appears to be the primary, while the other with slightly poorer materials and more compromised constructional solutions appears secondary. Even in a monument such as Troldstuerne, where the chambers are of identical size and form, such differences can be observed (Dehn *et al.* 2000, 133ff.; Dehn & Hansen 2000a).

The seven passage graves in which bark has been recognised in the construction do not stand out as a group relative to other passage graves. Ubby Dysselod and Snibhøj are both unusual because of the high quality stone used in their construction and their size, but the actual construction itself is in both cases normal for the areas in which they lie. Ubby Dysselod does however have a unique roof construction in the innermost part of the passage where it meets the chamber, but in ground plan it is identical to Grønnehøj which lies 70 metres away. Rævehøj does not especially distinguish itself constructionally from other monuments in the area, but its execution is remarkable due to the optimal exploitation of the size of the stones, resulting in the chamber being among the highest known. The chamber in Maglehøj distinguishes itself today due its good state of preservation, but according to central and eastern Zealand norms the construction is nothing special. It is about 2 metres shorter than the chamber in the demolished passage grave Højgård (or Ildhøj) 110 metres away, which is the largest in a group lying east of Tryggevælde river (Tornbjerg 1992, 67). Neither Olshøj nor the southern chamber in the Hvalshøj passage grave stand out in terms of construction or size relative to the standards in the areas in which they lie. Only the roof construction in Hvalshøj's northern chamber is distinctive, but not unusual. Neither does Jordhøj distinguish itself sizewise or constructionally from other megalithic graves in the area along the south coast of Mariager Fjord. At Ormehøj 120 metres away there is, however, a secondary chamber with an unusual construction (Rigsantikvarens Arkæologiske Sekretariat (ed.) 1995, 175, no. 408).

The inventory of artefacts, and the general find

picture in the monuments with preserved bark, are not different from those of passage graves generally. It does not seem that bark is only found in monuments that are distinguished by a higher standard of construction and execution. It may seem remarkable that bark has been found in two of the highest chambers in the country, Ubby Dysselod and Rævehøj, but several megalithic graves in north-western Zealand can be said to be among the most technically advanced and variable in the country. Snibhøj also stands out on account of its size, but Hvalshøje and Jordhøj also lie in the same part of Jutland. The fact that there are three relatively high chambers among the seven with preserved bark may suggest that a contributing factor could be that efforts to protect and preserve through time have, to a greater extent, been directed towards more unusual monuments. There is, furthermore, a greater chance of these high chambers have been partly earth-free. Accordingly, the use of bark in the construction of the dry walling cannot be linked unequivocally to chambers of a particular constructional standard.

Neither are there unequivocal indications that particular parts of the chamber were preferred in this respect. Similarly, bark occurs in passage graves of widely differing types and with a geographic distribution covering most of the country, from Hvalshøje in the west to Maglehøj in the east. As will be apparent later, a relationship can be perceived between the state of preservation of the bark and conditions in the chamber and behind the dry walling. Against this background it appears, on the basis of the eight occurrences known to date, that bark was a usual component in passage grave construction, and that it was used in connection with the building of the dry walling and the intermediary layer. It is still however questionable whether it also was used in the passages as Jordhøj is the only known occurrence and here it is found in dry walling standing closest to the chamber. It is possible that bark was not necessary in the passages as the capstones here are substantially lighter than those of the chamber and the pressure on the dry walling is therefore less. The lack of occurrences in passages is however more likely to be explained in terms of the poor conditions for preservation; wind and weather have a greater effect on preservation the nearer one approaches the entrance. As a consequence, dry walling in the passage is often seen to have suffered greater deterioration and has thus been restored to a greater extent.

In a number of monuments it seems, however, most unlikely that bark was ever used, namely those monuments in which chalk mass was used between the courses. This phenomenon is known from some areas of the country and here it is of course illogical to use the term "dry walling", as the chalk/water mixture has been used as a building material with a parallel function to mortar. As the word "dry walling" is so ingrained in the terminology concerning megalithic graves, the word is used anyway to refer to a wall of horizontal slabs stacked up between the orthostats, regardless of which material there is between the individual slabs. Chalk mass between the slabs of the dry walling is seen for example in Regnershøj in western Zealand (Dehn *et al.* 2000, 229ff.) and in one of the passage graves on Knudshoved Odde in southern Zealand (Vordingborg parish sb. 63). On Møn chalk mass has been used to excess in Jordehøj, where it is also included in the roof construction over the chamber (Dehn *et al.* 2000, 93ff.; Hansen 1993, Fig. 78). In the Sparresminde passage grave in the same area, chalk mass is used as a sealant both in the intermediary layer and on the rear of the dry walling. There are natural occurrences of chalk visible in the ploughed fields in the vicinity (Rigsantikvarens Arkæologiske Sekretariat (ed.) 2000, 136, no. 157). Attempts have been made to locate bark in passage graves where chalk mass has been used between the slabs but its presence has not been demonstrated.

At a few places a clay/water mixture seems to have been used as a sealant between the slabs. This applies to among others Kong Svends Høj (Hansen 1993, 53) and Ettrup (Rigsantikvarens Arkæologiske Sekretariat (ed.) 1997, 178f., no. 273). Birch bark was not, however, observed in connection with these, neither is it to be expected solely in the light of the conditions for preservation in the monuments in question.

With the exception of a small minority of passage graves where, due to natural occurrences in the vicinity, chalk mass or similar material has been used between the individual courses, there is a great deal of evidence to suggest that the use of bark between the slabs was common across the whole country. Furthermore, it seems probable that it originally was present in the whole chamber and possibly also in the passage. Experiments with the use of birch bark in connection with restoration work show that the total work involved in obtaining, preparing, shaping and finally using the bark for each individual monument has been considerable. This process is therefore an

important factor when attempting to calculate the resources used in megalith construction; the same applies of course also to use of chalk mass. In the light of this it must be presumed that the use of bark was a significant element in the construction, but to what end? It was hoped that the investigation of Maglehøj in 1996 would provide some answers to this question, but this hope was not fulfilled. It could only be established with certainty that the bark today lies in two layers between the surfaces of the slabs and not along the edges at the sides or to the rear.

The purpose of using birch bark in megalithic graves

As the investigations at Maglehøj did not give clear answers to the question of use we must make do with conjecture. Birch bark has been used for many purposes through time in different parts of the world, for example in North America, Siberia and Northern Europe. In Indo-European languages the word "birk" (=birch) means "the white". Examples from Danish prehistory include the birch bark found at the causewayed camp at Markildegård in southern Zealand (Østergård Sørensen 1995, 18ff.) and from the Bronze Age, the Egtved grave, where there were two bark buckets, one made from lime, the other from birch. At Nydam, one of the sacrificial bogs with war booty from the Iron Age, recent investigations have recovered a box made of birch and pieces of birch bark of unknown function. Birch bark letters are known from Russia and Sweden from the Late Viking Age. There are also Neolithic finds of bark from Sweden, but only as impressions; burned fragments of clay in a dolmen chamber bore impressions which included rushes, straw and bark. The pieces are however interpreted as traces of an earlier house on the site (Bägerfeldt 1992, 73). In recent times birch bark has been used in Finland, Norway and Sweden for many kinds of domestic items and personal equipment such as boxes, cooking vessels, rucksacks, waterproof clothing and wind (musical) instruments; the bark has been used both as whole sheets and as woven strips. In the Sami culture in particular the material has many uses. In early Scandinavian building culture birch bark was used for roofing log cabins, partly as a roofing material in itself, partly as a water-repellent underlay for grass turves. When used as an underlay there could be up to 15 layers of bark under the turves arnd it was important that the bark extended beyond the underlying timber construction. Both Olaus Magnus in the 16th century and Carl von Linné (Linnaeus) in the 19th century give accounts of the production of, trade in, and use of, birch bark. In trade there were defined sizes for the bundles of bark (Ågren & Lundholm 1970, 7ff.). In Denmark a practice is known from recent times whereby the ends of beams in walls were wound with birch bark in order to prevent the wood rotting (Suenson 1922, 82). Where birch bark has been used in connection with buildings – tents, wooden or stone houses - it has often been with function of a membrane to repel water or damp. The same could also have been the case in passage graves.

Investigations of the construction of megalithic mounds immediately around the chambers and passages show that efforts were made in several ways to keep the grave chamber sealed and hereby dry. This was observed as early as 1823 with the opening of Maglehøj, as the vicar in his report writes: "Remarkable care has been taken to protect the burial place from penetration by water and damp". It was probably known in the Stone Age that even small leaks could result in material from the mound being eroded into the chamber by water which percolated down through the mound layers. This could result in rapid decay, which would lead to an unstable construction. The precautions that were taken against this vary in nature and extent, but they are always included in the construction in one way or another. Experience from modern restoration shows that they are also effective. Decay necessitating restoration is almost always the result of interference i recent times, while undisturbed original constructions as a rule still fulfil their function. On Møn these precautions can be very thorough as for example those seen at Jordehøj. Here there are two layers of roofing slabs lying in chalk mass, packings of crushed flint at the rear of the walls to lead water away, and a drain channel at the base (Dehn *et al.* 2000, 93ff.). Overlapping flat stones acting as a throating along the edges of the capstones, so that water is led away from the chamber, are common occurrences (Hansen 1993, Fig. 83). Furthermore, clay is seen close to the chamber in mounds that consist predominantly of sand. The use of crushed flint or other stone is also important for ensuring that the construction remains watertight and stable. Bark between the individual stone slabs has presumably contributed to the attainment of this goal. Even though the selection and shaping of slabs for the dry walling was very careful it must have been almost

impossible to achieve a perfect fit between the slabs. They had both to be of a size and shape that fitted into the respective gap between the orthostats and also to lie horizontally, preferably with a slight backward tilt. This is the experience gained from restoration work, which in this respect can also be considered as experimental archaeology. A piece of bark could have evened out the small irregularities in the slabs and kept out any water which may have seeped in.

It is also possible that longer pieces of bark covered the rear of the wall (Hansen 1993, 53). If the individual pieces of birch bark in the wall were of greater length they could have hung down, overlapping each other on the rear of the wall. This would very effectively have kept out water which otherwise could seep from the mound fill, through the wall and into the chamber. At Maglehøj, where the rear of a complete section of dry walling was uncovered during the investigation in 1996, there were no traces of bark having been used in this way. However, not even the smallest piece of bark could be seen outside the surfaces of the slabs; it could easily have been there originally but sheets of bark lacking a stable flat underlay cannot be expected to be preserved.

Experiments in connection with restoration work show that the placing of folded pieces of bark between the slabs can be difficult in practice. During the construction of a wall the many layers of bark have a cushioning effect making it difficult to place the slabs correctly so that the fit ideally relative to the edges of the orthostats; the higher the wall, the more difficult this becomes. The problem can probably be reduced by harvesting the bark at the correct time of year or by using a technique whereby the bark is kept under pressure while the wall is being built. The correct preparation can also help. The bark can be soaked in water before use, as has been tried in the restoration. Here the bark used comprised about 15-20 sheets. The cushioning effect is, however, obviously dependent on the thickness of the bark. From the use of birch bark in recent times we know that the bark is easiest to harvest in the period from early spring until mid-summer, as it is easiest to loosen when it contains sap. Harvesting is possible at other times of year especially after a period of frost, and bark harvested in the autumn and winter is stronger. The bark is cut from the tree in sheets or long strips. The inner side of the bark can be light- or dark-coloured dependant on where the tree has grown and when the bark is harvested. The newly harvested bark should be put under pressure as soon as possible to prevent it from rolling up. The fresher it is the easier it is to use, but if it has dried out it can be made more flexible by soaking it in lukewarm water. If the bark is cut from a tree without damaging the cambium then the tree will not die but will grow more slowly; on the other hand the wood produced by the tree is harder (Ågren & Lundholm 1970, 31ff.).

Perhaps the feathering effect is the very reason for the presence of bark in megalithic graves. The construction of a passage grave takes place in several stages. One of the most decisive is the laying on of the capstone over the chamber, after the orthostats have been raised, the dry walling built up and the possible intermediary layer laid in place – all of it presumably thoroughly braced with timber constructions. When a 5-10 ton stone is lowered onto a newly constructed underlay with 20-30 courses of sandstone slabs in a section of dry walling as well as typically 1-6 courses in an intermediary layer, consolidation will occur. There is therefore a great risk that the slabs in the dry walling, or especially those in the intermediary layer, will crack. This has been observed during restoration work, when the capstone is replaced over the newly constructed dry walling. It can also be seen when, due to decay, subsidence of the capstones occurs. The effect can be registered in the form of broken slabs in the intermediary layer below. Even though slabs and bark have perhaps been under some pressure during construction there will still be a certain cushioning effect which can prevent breaks. The bark has also had another effect. In a construction with many small and large stone slabs, with crossed joints, there are relatively few points of contact between the individual stones; this increases the pressure on individual points. The two layers of bark between all the horizontal slabs will distribute the pressure so that breaks are avoided when there is a sudden increase in load. The laying of a thin layer of lead between granite blocks used in the foundations of 18-19th century houses performed a similar function.

The same must also have applied in the chambers with chalk mass between the slabs. The still wet chalk mass would redistribute the pressure to the whole surface instead of concentrating the weight on 3-5 points of contact between the individual slabs. At the same time the chalk mass also has the ability to give a little when the capstone is added.

The bark used between the slabs in megalithic graves can thus have functioned both as a membrane preventing the entry of damp and mound fill into the

grave chamber and as a pressure absorbent material for avoiding breaks when the capstones were added or during later consolidation due to the many tons of mound fill over the capstones. The same function was performed by the chalk mass. However, in order to achieve these effects it may not have been necessary to place the bark so regularly and systematically with a fold completely in line with the inner side of the dry walling as can best be seen at Maglehøj. It could have been done to satisfy aesthetic demands. An intact well-built and closely-fitting dry walling without preserved bark gives us today the impression of regularity and order; the inner surfaces of the slabs together form a flat, vertical wall with the individual slabs in different nuances of shade and colour. It is often the case that above a slab with a twisted or irregular upper surface a corresponding slab has been placed, the underside of which matches that below, almost likes pieces of a jigsaw puzzle. Correspondingly, a number of slabs with wedge-like facades can be laid alternatively giving a horizontal upper surface. The light-coloured folded bark in all the gaps has, just like the chalk mass, emphasised the slab construction of the wall in the slightly darker gaps between the orthostats and has provided a contrast to the many colour nuances in the freshly broken edges of the slabs. It is very probable that the light-coloured folds of the bark and the white chalk mass have also served a symbolic or decorative purpose and with regard to this it is tempting to compare the light-coloured stripes with the chalk-filled ornamentation on the pottery vessels from the period.

The use of birch bark in the construction of megalithic graves is probably not the only function that this material had in the Neolithic. The base of one of the Early Neolithic system pits at Markildegård appears to have been covered with sheets of birch bark, held in place by horizontally-placed branches; in the basal layer there were also sherds from seven funnel beakers (Østergård Sørensen 1995, 18ff.). Throughout most of prehistory people were presumably familiar with the material for the production of household objects and personal equipment in the same way as is known from the Sami culture. Here, and in recent times over all of Northern Scandinavia, there is a long tradition of harvesting and working with birch bark.

Dating – archaeological and radiocarbon

The birch bark in the dry walling of megalithic graves was put in place during construction. Accordingly, it provides the opportunity for a more correct dating of the construction of the monument than the artefacts placed in or at the monument during its use as a grave chamber and cult site. Establishing the precise date of construction will be a very important indication of whether the many different constructional features are chronologically determined, if techniques were developed and improved and whether for example characteristics of craftsmanship or geography also play a role. In this respect there is unfortunately too great an uncertainty with regard to the available radiocarbon dates. Apart from the result from Olshøj (see Postscript) which fall outside the period to which the passage graves are usually dated, the results from the other monuments confirm the chronological placing of the passage graves in the middle Neolithic. Neither is there any reason to dispute the few dates for monuments based on their Middle Neolithic artefact assemblages.

Birch bark and pollen analysis

Two species of birch occur naturally in Denmark, Betula pendula and Betula pubescens, but the bark sheets from the passage graves are too poorly preserved for it to be possible to determine which species has been used. Neither is this possible by way of pollen analysis. In present-day Sweden it is the latter species which is the most important source of raw materials.

Pollen analyses from megalithic graves are an important factor in revealing the vegetational history of the Neolithic. The samples taken from mound fills and underlying old soil surfaces in connection with the restoration of passage graves since 1987 in collaboration with Svend Th. Andersen, Geological Survey of Greenland and Denmark (Andersen 1997, 161ff.) contribute to this picture.

Of 25 megalithic monuments, five dolmens and 20 passage graves, from which pollen samples have been taken and analysed, there are only two where bark has been observed (Andersen unpublished). Samples were also taken at Maglehøj but here pollen was not preserved. Pollen was, on the other hand, present at Jordhøj and Hvalshøje. At Jordhøj, samples were taken from the old land surface under the mound

in connection with the re-opening in 1994 of one of the excavation fields investigated in 1964-65 (Kjærum 1970; Rigsantikvarens Arkæologiske Sekretariat (ed.) 1995, 175, no. 406). Samples were also taken from the old land surfaces under the mounds at the passage grave of Ormehøj, 120 m to the east of Jordhøj (Rigsantikvarens Arkæologiske Sekretariat (ed.), 1995, 175, no. 408), and the long dolmen Kongehøj, lying 700 m to the west (Rigsantikvarens Arkæologiske Sekretariat (ed.) 1995, 175, no. 407). At all three sites tree pollen dominated in the analyses with values ranging from 78-93%. Of the tree species, birch was dominant with values of 64-91%. At Jordhøj and Ormehøj 40-46% of the pollen had been deformed by exposure to heat and the diagrams show that Jordhøj was built on a site with birch scrub which had been cleared and burnt shortly before the mound was constructed (Andersen 1995, 17ff.).

At Hvalshøje samples were taken from the old land surface in a section between two orthostats in the northern chamber during restoration work in 1996. The analyses here showed a predominance of herb pollen, especially ribwort plantain, Plantago lanceolata and wild grasses, while tree pollen was sparse, only 10-18%. Alder, Alnus was the dominant tree species with 70% of the tree pollen, while birch was very poorly represented with only 1.7%. The conclusion is that the site on which Stone Age Hvalshøje was erected had been used for intensive grazing by domesticated animals over a longer period of time and that the trees stood on damp soils (Andersen 1997, 14ff.).

Quite by chance the results from the two mounds each reflect their part of the vegetationally very varied landscape which is apparent when the results from 35 localities are combined (Andersen 1997, 16ff.). They show great differences between the individual monuments, both with regard to woodland composition and land usage, but no regional differences are apparent. The landscape was dominated by lime, Tilia woodland and woodland consisting of a mixture of lime, hazel, alder and birch. Birch pollen, in particular, occurs in large numbers. Several of the areas of woodland with the character of scrub have been burned and hazel and birch woodland is promoted by human activity. Pollen from the passage grave in the Tustrup complex on Djursland (Kjærum 1958; Rigsantikvarens Arkæologiske Sekretariat (ed.) 1995, 177f., no. 418) has shown that the birch woodland here was burned twice, in between which there was grazing by domesticated animals and regeneration of the birch scrub in a swidden rotation. The reason for birch woodland being included in swidden agriculture is due to the fact that birch regenerates more readily naturally from seed after burning than the other tree available species. 67-89 % of the woodland, generally with birch, hazel and lime, was burned, of this the birch woodland made up 50 %. (Andersen 1997, 16ff.). Several areas of birch woodland in the landscape around the passage graves are thought to have had the character of scrub woodland because they were included in the swidden agriculture. The question is whether the trunks in the scrub woodland were able to provide sheets of bark of the size required for megalith construction. There were, however, areas of more established woodland and it should also be remembered that the pollen spectra from the mounds show in particular the vegetation in the immediate vicinity of the mounds. Regional pollen diagrams also show rich occurrences of birch with a maximum being apparent in the Early Funnel Beaker Culture.

Accordingly it appears that there was no lack of birch bark for megalith construction. In addition it should be remembered that birch is a relatively rapidly growing tree and that the bark of young trees appears to be most suited, whereas that on older trees becomes knotted and difficult to remove in regular sheets. An important feature, which distinguishes bark from all the other materials included in the construction, is that it is easy to transport over long distances. There is naturally the possibility that part of timber that was needed both for transporting the stones and in the building work itself, comprised slender birch trunks, which were fully usable without bark. Birch bark can split into thin sheets as each sheet reflects a single year's growth. At Rævehøj the bark was split into up to four sheets, but it was not possible to establish whether each of these in reality consisted of several compressed pieces.

Conditions for the preservation of bark in passage graves

There are two characteristic features of passage grave chambers with intact bark between the slabs of the dry walling. One is that they are always free of earth. Most chambers have, due to secondary use later in prehistory or opening in recent times, been filled with earth either after being sealed or as a consequence of decay. It is clear that prolonged exposure to earth

will cause the bark to rot and decay leaving no traces. Another characteristic feature is that behind the dry walling there are very substantial packings of crushed flint. The packings are so thick and compact that neither sand nor earth has infiltrated them. The latter depends of course again on which material has been used to hold the packing up against the rear face of the wall. With a mound fill of pure clay the border between the flint-packing and the mound fill will remain very sharp, whereas if the mound fill comprises stones and sandier material the distinction will be less clear.

When the chamber has the original mound covering intact and otherwise satisfies the above two conditions – earth-free chamber since the Stone Age and earth-free stone packings behind the dry walling – there are optimal opportunities for the preservation of bark, as air could circulate around the bark, which has lain without contact with bacteria in the soil. It is a tempting thought that people understood this already in the Stone Age and that the massive flint-packings were built up with this in mind. Factors other than the flint-packing and the earth-free chamber are also involved, as both Maglehøj and Jordhøj satisfy the conditions, but at Maglehøj the bark is still very well preserved whereas at Jordhøj, which was opened 70 years later, it is now in very poor condition. It is apparent from the description in the report from 1890 that the bark that was seen on opening Jordhøj was considerably better preserved than it is today. At Maglehøj today the bark still lies to a great extent *in situ* in large continuous sheets that are dry and crisp. At Jordhøj there is only a little left in the form of small, scattered scraps which do not lie *in situ* and which are soft and decaying. This could mean that factors other than the two mentioned above are involved in preservation. It could be the climatic conditions in the chamber, linked to the size and shape of the monument, as well as the construction and composition of the materials chosen for the enclosing mound. Large fluctuations in temperature over short periods of time often result in condensation forming on the walls and ceiling of the chamber and some chambers are, due to differences in size and construction, susceptible to this to a greater extent. Secondary entry through the roof or the intermediary layer can mean that the roof-covering over the capstones has not been re-established and rainwater can therefore percolate down into parts of the chamber; this is seen for example at Rævehøj. A large number of visitors in the chambers will also have consequences for the air humidity, which ideally should be low and constant.

Not all the eight passage graves known to contain bark have been completely earth-free since the Stone Age but special circumstances apply in these cases. From Maglehøj, Jordhøj and Snibhøj there are reliable reports that a burial layer with grave goods and bones lay exposed on the floor on opening. At Ubby Dysselod there was a small amount of soil on the floor and traces on the wall still show today how high this lay. From this it is apparent that the preserved bark has not been covered. At Olshøj there are no reports concerning the appearance of the chamber on opening, but it is known that there were openings between the capstones in the period between 1871 and 1900. Therefore an earth layer must have accumulated on the floor, at least in this period. We know that the bark in Rævehøj and Hvalshøje was covered by fill for shorter or longer periods, but the observations at Rævehøj can give an indication as to the reason for small pieces of bark being preserved despite this. Shortly after the opening in 1852 one end of a capstone collapsed into the chamber and lay some way above the floor level on recent fill beside the dry walling with bark. This and other information suggests that the chamber was partly earth-free on opening, but theoretically the chamber could have been completely emptied of its possible earth fill on being opened. In any case the earth fill covered the dry walling with bark from the time the capstone collapsed until the time of the restoration, as when the latter commenced in 1932 no capstone was visible due to the presence of recent fill. In the gap there was folded bark between nine slabs, 2-4 cm in size. The reason for this small section of wall with bark not having been destroyed was that the wall had fallen slightly backwards into the narrow gap and had been protected on its outer surface by stones and clay, probably deposited as early as the opening of the chamber in 1852 or immediately after. The relatively good condition of the bark is probably due to an earth-free pocket having been formed in front of the small section of wall. Something similar may also have occurred at Olshøj and Hvalshøje. Fallen slabs or a pile of stones could have formed a pocket in front of the slabs, between which a little bark remains. We know nothing of the conditions on the opening of Olshøj, whereas at Hvalshøje the southern end of the chamber with the dry walling in question was completely filled with heath soil, whereas the remainder was only half filled.

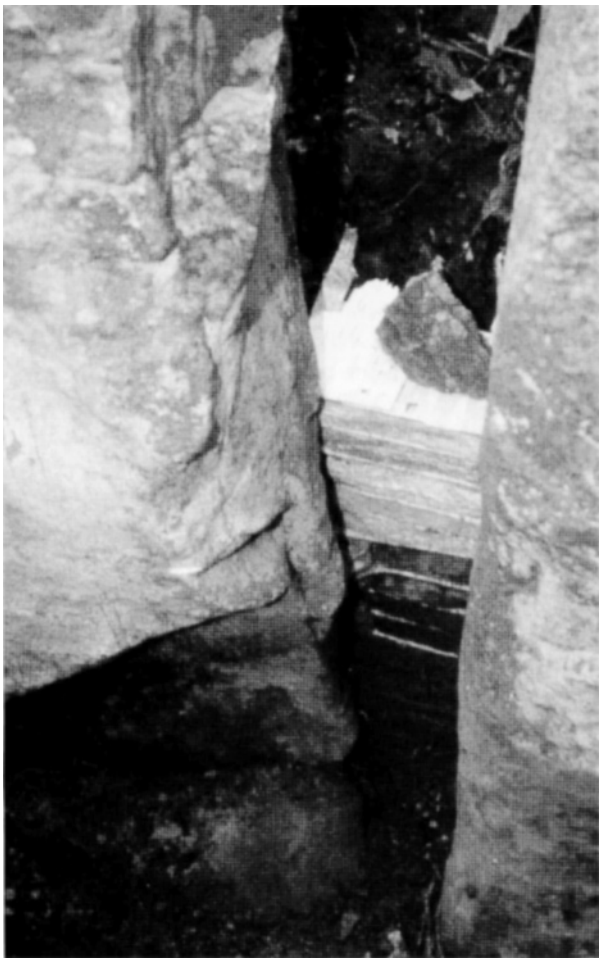

Fig. 8. In connection with the rebuilding of the dry walling under restoration work experiments were carried out with the use of birch bark, both between the original, re-used slabs and between newly shaped additions. Previous softening of the bark in water made handling easier. Passage grave north of Birkerød, 2000. Photo Torben Dehn.

Conclusion

The use of birch bark in the construction of passage graves appears to have been common. It has been demonstrated in various types of monuments with a wide geographic distribution covering much of Denmark. In some monuments it appears to have been used throughout in the chamber, whereas its use in the passage is less certain. There are several possible explanations for the use of folded bark between the slabs in the dry walling and the intermediary layer. One of the aims was presumably that the bark, as one of several elements, should prevent water and damp in the mound fill from penetrating the grave chamber. Another function could be that the bark acted as a shock/pressure absorbent material and as such prevented cracking of the slabs during construction. A third possibility is irrational, namely that the dry walling with bark was of significance as a symbolic or decorative expression. Several observations suggest that in European megalithic architecture the colour of the stone could have had some significance (Lynch 1998, 62ff.). In particular the colours white, red and black occur repeatedly. The suggestion of a conscious colour choice occurs also in the Nordic monuments, for example the white burned flint on the floors, the white casing stones at Ubby Dysselod and Grønnehøj, as mentioned above, or the tall, red gable stones at the southern end of Kong Svends Høj (Dehn *et al.* 1995, Figs. 147-148). There are some passage graves from Scania where special attempts appear to have been made to obtain red sandstone slabs especially with regard to the dry walling (Hårdh & Bergström 1988, 49). It is therefore also a possibility that the contrast between the thin, light coloured bark stripes and the freshly cloven dark stone slabs was intended either as an aesthetic or a symbolic expression. None of the three functions mentioned here need necessarily exclude the others – the same constructional element could easily have served several purposes simultaneously.

In any case, the use of birch bark, just like the chalk/water mixture, is yet another piece of evidence for passage graves as complicated and complex constructions. There can be great variation in constructional details, according to the choice or availability of materials, but regardless of how ambitiously or carefully the building work appears to have been carried out, a common thought or intention behind the construction can be traced, namely maximum stability and durability. The extensive use of birch bark in many different chamber types supports this interpretation. At the same time there is a reminder of the fact that megalith construction does not just involve earth and stone but that wood in several forms must have played an important role. If calculations are made regarding the resources involved in the construction – both materials and manpower – the use of bark (or chalk) is therefore not an insignificant factor.

Bark is not known from dolmen chambers, but it is likely that it was used in the larger chambers,

where dry walling was employed in the same way as in passage graves. The construction of the mounds enclosing dolmens varies considerably (Dehn *et al.* 2000, 194), but complicated constructions on a level with that of the passage graves do occur. An example is Klokkehøj on southern Funen, where each individual slab in the dry walling appears to have been set in clay. Similarly, there is a clay panel in the lowermost part of the mound to stabilise the orthostats and the dry walling (Thorsen 1981, 113ff.). The authors investigated a dolmen chamber of a corresponding type in a long barrow in the same area (Pipstorn Skov sb. 26, Diernæs sogn) in 2000. Here there was also a clay panel that was highest behind the dry walling, where crushed flint had also been used. In addition, it could be seen that the mound around the chamber had been constructed at in several stages. These examples suggest that just as much effort and consideration has been put into the construction of some dolmens with regard to sealing and stabilisation as with the passage graves, and it therefore seems likely that birch bark could also been used in some dolmens.

With the recognition of the fact that birch bark was commonly used in megalith construction and that it can reveal the very date of construction there is, by way of ^{14}C-dating, the opportunity for dating various monument types more precisely relative to one another. This means that it will be possible to determine whether technological developments took place in passage grave construction in Denmark or whether this arrived in a fully developed form. It will also be possible, if bark is present in dolmen chambers, to shed some light on the circumstances surrounding the transition from dolmen to passage grave construction. With the exception of the larger dolmens there can be significant constructional differences between dolmens and passage graves. The dates that have been obtained for birch bark confirm previous assumptions that the passage graves were erected in the course of a short period of 200-300 years. Unfortunately, one or two dates from each of eight monuments does not provide a statistical foundation on which to base further conclusions. This requires material from several monuments, and in order to eliminate the uncertainty with calibration of dates in this period several samples are needed from each monument. It is hoped that systematic investigation of monuments with optimal conditions for preservation will give the opportunity for additional and, therefore, more certain dates.

Postscript (January 2005)

The manuscript for this article was submitted in November 2000. Since then additional discoveries have been made particularly by the participation of Jørgen Westphal in investigations of megalithic tombs in recent years. These finds have not however led to changes in the main points of the original article so it has therefore not been altered apart from some editorial corrections. In this postscript the latest observations are described.

From 2001-2004 birch bark has been found in two additional megalithic tombs and a new dating result of material from Olshøj passage grave, which is described in the article, is available. One of the two new occurrences is in the stordysse Grønhøj (Hatting parish sb. 102) (Thorvildsen 1946). Between two courses in the upper part of a dry-stone wall, in the chamber's east side, a small amount of bark was found. It was not possible to distinguish two distinct layers or a fold, but the character of the material was unmistakable as bark similar to the previously identified examples, and the material has also been identified as birch bark. It has been dated to ca. 1650 bp. (AAR-7976), and this remarkably young date means that the reliability of the sample might be questioned. When the chamber was opened in 1835 there was a partial collapse and it wasn't until 1940 that it was restored. For over 100 years the chamber was more or less open and overgrown, and this can conceivably have affected the dating. It is therefore best to leave the find in Grønhøj out of this article until this aspect has been cleared up.

Øm passage grave. The second megalithic tomb with newly found birch bark is Øm passage grave near Lejre (Glim parish sb.13). It is a listed round mound/barrow with a well-preserved megalithic chamber with passage. The chamber and passage were found in 1831 and opened by the owner's sons, who broke a small opening through the chamber's roof stone, but who then searched for the entrance and dug their way in through the passage, having removed its covering stone (Johansen 2003). The passage was full of earth but the chamber was dry and free from soil. As early as in 1833 the mound/barrow and chamber were reinforced with earth, and a stone wall and a locked wooden door were added. Since then only moderate refurbishment has been carried out, most recently in 2003 where it was found that behind the stone wall from 1833 is an intact kerb around the barrow and that a cobbled chamber floor, which was also recorded in

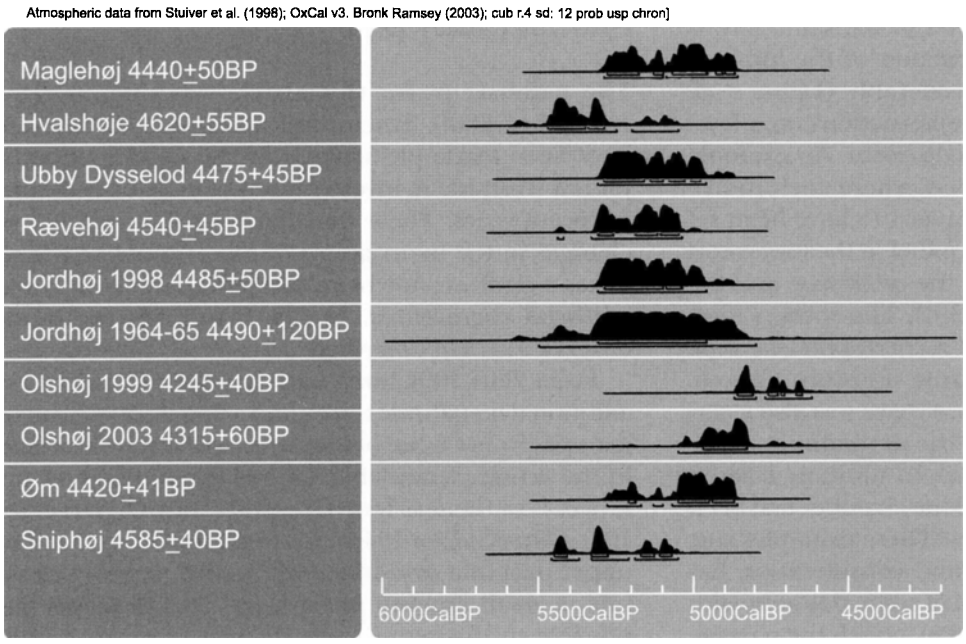

Fig. 9. Calibrated ^{14}C datings of birch bark from eight Danish passage graves. Calibration has been done by the OxCal 3.9 by Jørgen Westphal.

1833, is still preserved.

The chamber is solidly built of almost rectangular orthostats, closely spaced. The four large roofing stones rest on an intermediate layer of large flat stones, which do not form regular course skifter to increase the height, but are rather used to level out the roofing and they also serve to fill the spaces between the roofing stones' narrow ends. Outermost along the passage are a set of twin stones (Hansen 1995) and there is just one sill-stone to one side, which is not an unusual feature. The partially preserved original dry-stone wall consists of somewhat rough flagstones, mostly sandstone, with a considerable amount of crushed unburnt flint as packing behind. The monument is thus a well-built construction, which architecturally or in terms of its construction is very similar to the other passage graves in the area.

When the passage grave was opened in 1831 a volume of bones and a few finds were found, which initially were lost, but some of which were later sent to the Danish National Museum. The find assemblage indicates that the grave was used, not only in TRB but also in the Late Neolithic and in the Bronze Age. The birch bark was found in just one of the chambers' recesses in the 3rd course about 80 cm above the level of the floor. The bark here is remarkably well preserved, in some places in two layers and with traces of a fold, in towards the chamber, similar to that illustrated in Fig. 4. One sample has been identified as birch, *Betula sp.* The sample has been radiocarbon dated to 4420 ± 40 bp. (AAR-8723), calibrated (Stuiver *et al.* 1998) ± 1 st. dev. 3120-2910 BC.

The dates of the birch bark from the passage graves do not conflict with the known find assemblages or with each other (Fig. 9), although there is one ^{14}C dating which is 100-200 years later than expected, specifically the dating from Oldshøj of 4245 ± 40 bp. (AAR 5472), calibrated (Stuiver *et al.* 1998) ± 1 st. dev. 2910-2710 BC. Therefore in 2003 an additional dating of the material from the same place in Oldshøj was undertaken and the result was almost identical, that is 4315 ± 60 bp. (AAR 7975), calibrated (Stuiver *et al.* 1998) ± 1 st. dev. 3010-2885 BC. It is beyond the scope of this postscript to comment on this result.

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Calibration has been done by the Oxcal 2.18 program.

References

Andersen, Svend Th. 1995: Pollenanalyser fra gravhøje, 1994. *Geobotaniske undersøgelser af kulturlandskabets historie. Pollenanalyser fra gravhøje og søer i 1994. DGU Kunderapport nr. 12*, pp. 4-35.

Andersen, Svend Th. 1997: Pollenanalyser fra gravhøje, 1996. *Geobotaniske undersøgelser af kulturlandskabets historie. Pollenanalyser fra gravhøje og fra Skælskør Nor i 1996. Danmarks og Grønlands Geologiske Undersøgelse Rapport 1997/7*, pp. 4-20.

Andersen, Svend Th. (unpubl.): The cultural landscape of megalithic tombs in Denmark, reconstructed by soil pollen analysis. Unpublished manuscript from 1995.

Antiquarisk Tidsskrift 1847: Antiquarisk Tidsskrift, udgivet af Det Kongelige Nordiske Oldskrift-Selskab, 1846-1848.

Bahnson, Kristian 1892: Meddelelser fra Nationalmuseets Danske Samling. Stenalderen. *Aarbøger for Nordisk Oldkyndighed og Historie* 1892, II. Række, 7. Bind, pp. 161-206.

Bägerfeldt, Lars 1992: *Megalitgravarna i Sverige. Typ, tid, rum och social miljø.* Gamleby.

Boye, V. 1862: Udgravning af en Jættestue ved Hammer. Et Bidrag til Opfattelsen af de i Steenalderen herskende Gravskikke. *Annaler for nordisk Oldkyndighed og Historie* 1862, pp. 323-355.

Dehn, Torben & Hansen, Svend & Kaul, Flemming 1995: *Kong Svends Høj. Restaureringer og undersøgelser på Lolland 1991.* Stenaldergrave i Danmark, bind 1.

Dehn, Torben & Hansen, Svend I. & Kaul, Flemming 2000: *Klekkendehøj og Jordehøj. Restaureringer og undersøgelser 1985-90.* Stenaldergrave i Danmark, bind 2.

Dehn, Torben & Hansen, Svend I. 2000: Tæt og tørt. *Skalk* 5, pp. 27-32.

Dehn, Torben & Hansen, Svend I. 2000a: Doubleness in the construction of Danish Passage Graves. In Anna Ritchie (ed.): *Neolithic Orkney in its European Context.* Cambridge: McDonald Institute Monograph. 2000.

Ebbesen, Klaus 1975: *Die jüngere Trichterbecherkultur auf den dänischen Inseln.* Arkæologiske Studier II, København.

Ebbesen, Klaus 1978: *Tragtbægerkultur i Nordjylland. Studier over jættestuetiden.* Nordiske Fortidsminder. Serie B – in quarto. Bind 5.

Hansen, Svend 1993: *Jættestuer i Danmark. Konstruktion og restaurering.* Skov- og Naturstyrelsen.

Hansen, Svend 1995: Tvillingsten. *Skalk* 5, pp. 16-17.

Hård, Birgitta & Bergström, Jan 1988: Red Walling in Passage-tombs. *Meddelanden från Lunds universitets historiska museum* 1987-1988 *(Papers of the Archaeological Institute University of Lund* 1987-1988*). New Series Vol. 7*, pp. 40-52.

Johansen, B-Joe 2003: *Øm Jættestue. En stenaldergrav i Danmark.* Little Creek Publishing.

Kjærum, Poul 1958: Storstensgrave ved Tustrup. *Kuml* 1957, pp. 9-23.

Kjærum, Poul 1970: Jættestuen Jordhøj. *Kuml* 1969, pp. 9-66.

Lynch, Frances 1998: Colour in Prehistoric Architecture. In Alex Gibson & Derek Simpson (eds.): *Prehistoric Ritual and Religion*, pp. 62-67. Sutton Publishing Limited.

Madsen, A. P. 1900: Gravhøje og Gravfund fra Stenalderen i Danmark II. København.

Rigsantikvarens Arkæologiske Sekretariat (ed.) 1995: *Arkæologiske udgravninger i Danmark* 1994.

Rigsantikvarens Arkæologiske Sekretariat (ed.) 1997: *Arkæologiske udgravninger i Danmark* 1996.

Rigsantikvarens Arkæologiske Sekretariat (ed.) 1998: *Arkæologiske udgravninger i Danmark* 1997.

Rigsantikvarens Arkæologiske Sekretariaet (ed.) 2000: *Arkæologiske udgravninger i Danmark* 1999.

Stuiver, M., Reimer, P.J., Bard, E., Beck, J.W., Burr, G.S., Hughen, K.A., Kromer, B., McCormac, F.G., v.d. Plicht, J. & Spurk, M. 1998: INTCAL98 Radiocarbon age calibration, 24,000-0 cal BP. *Radiocarbon* 40, pp. 1041-1083.

Suenson, E. 1922: Byggematerialer. Metaller, Træ, Natursten, Lervarer, Mørtler, Beton, Kunststen, Glas. Fremstilling, Egenskaber, Anvendelse, Prøvning. Bind 2. København.

Tauber, Henrik 1967: Danske kulstof-14 dateringer af arkæologiske prøver II. *Aarbøger for Nordisk Oldkyndighed og Historie* 1966, pp. 102-130.

Thorsen, Sven 1981: "Klokkehøj" ved Bøjden. Et sydvestfynsk dyssekammer med bevaret primærgrav. *Kuml* 1980, pp. 105-146.

Thorvildsen, Knud 1946: Grønhøj ved Horsens. En Jættestue med Offerplads. *Aarbøger for nordisk Oldkyndighed og Historie* 1946, pp. 73-94.

Tornbjerg, Svend Åge 1992: Højgård. En jættestue ved Varpelev. *Årbog for Køge Museum* 1991, pp. 65-80.

Østergaard Sørensen, Palle 1995: Markildegård. En tidligneolitisk samlingsplads. *Kulturhistoriske Studier*, pp. 13-45.

Ågren, Katarina & Lundholm, Karin 1970: Näverslöjd. ICA,Västerås.

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Strandet Hovedgaard Children's graves of the late Single Grave Culture in North Jutland, and some social and cultural considerations

by John Simonsen

ABSTRACT

This article focuses upon a destroyed barrow with an exceptional number of children's graves. The different types of grave and grave goods are discussed and the development of the barrow described. The finding of a large number of short stone cists at Strandet Hovedgaard is of special research interest, and provides an opportunity to present a survey of several important finds from North Jutland.

The explanation of the presence of the children's cemetery is discussed in relation to the problem of the child-adult threshold in traditional societies. The possible social role of children in the late Single Grave Culture is discussed along with other socio-cultural considerations. The analysis indicates that in certain areas entirely new lines of thought may be appropriate with regard to social structure in this phase of the culture. Also two contemporary house sites are briefly presented below.

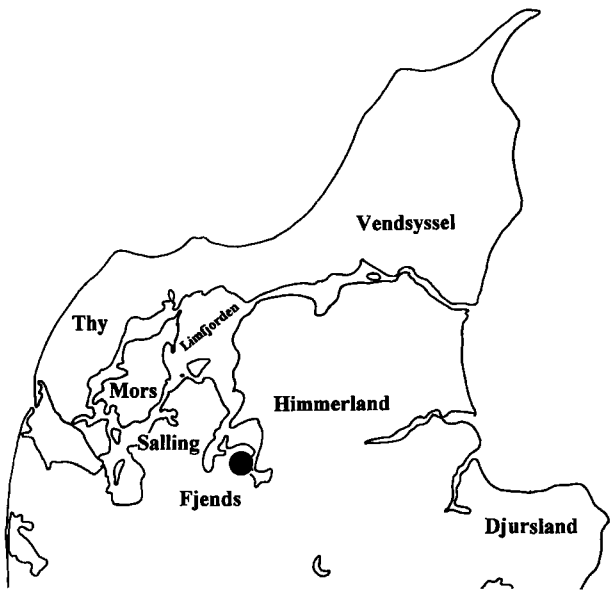


Fig. 1. North Jutland, showing the district names. Strandet Hovedgaard marked with a dot.

INTRODUCTION

The manor Strandet Hovedgaard is located in North Jutland in the area west of Hjarbæk fjord, which forms the central southern part of the Limfjord (Fig. 1). The agricultural lands of the farm, which have been under intensive cultivation for many years, have now been given over to permanent greenfields, while large tracts have been planted with trees. Before this planting the soil was subject to deep ploughing ("subsoiling"). In deep ploughed areas such as this about half a kilometre north of the farm, at the end of 1996 the plough

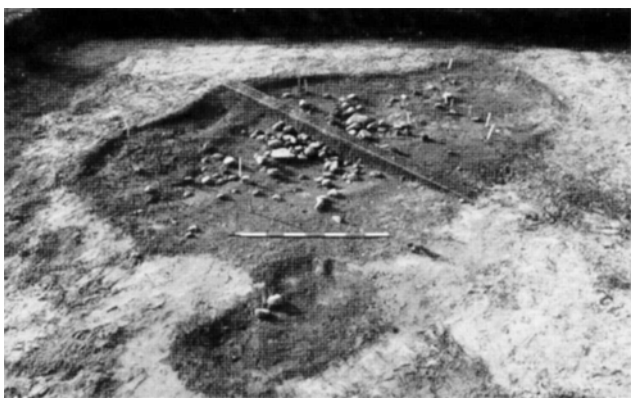


Fig. 2. Strandet Hovedgaard. Sinking in the southern building plot ("House 1") of the late Single Grave Culture under excavation. Seen from the east.

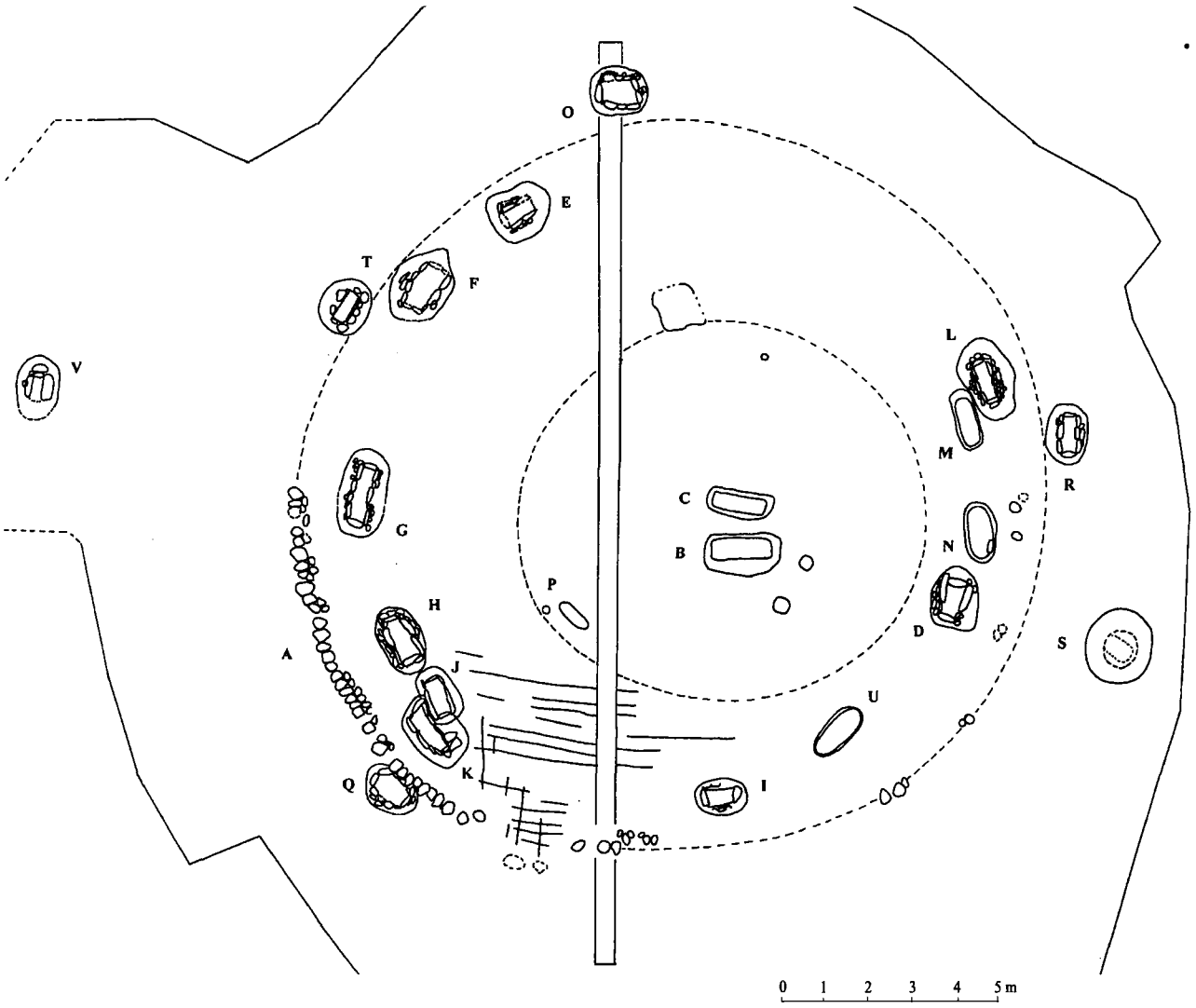


Fig. 3. Strandet Hovedgaard, feature V. Two phases of barrow construction were distinguished, with diameters of c. 9 and 16.5 m respectively. Only the later phase had a kerb ring of two closely spaced stone strings.

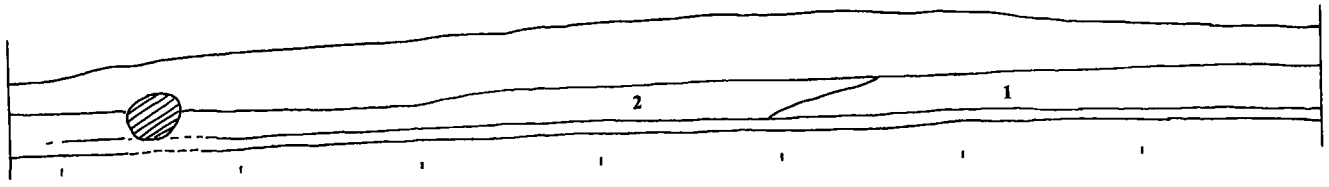


Fig. 4. Strandet Hovedgaard. Southern segment of the main section (N–S) through the severely plough-damaged barrow (feature V). At the top the plough soil, then the two phases of the barrow clearly visible, and then the old ground surface. To the left a protruding stone from the kerbstone ring.

brought hitherto unknown settlement remains up to the surface. These were the subject of repeated surveys followed by excavation between April and December 1997. On the higher land towards the west extensive traces of Bronze-age settlement in the form of pottery ploughed up from pits, ploughed-out cooking pits and ploughed-up soil which was fairly certainly from building post-holes were found.

In a lower area towards the east, meanwhile, settlement evidence of the later Single Grave Culture was found. There were traces of two building plots corresponding to the type with a hollow that is known from, inter alia, the late Single Grave Culture and Dagger Period (Hvass 1978; Simonsen 1973; 1986; 1987). These buildings were discovered during surveying of the ploughed-up soil and lay about 10 m apart from north to south. The excavation following the removal of the topsoil showed that the base of the hollows of these buildings was untouched and contained quite a lot of finds. The southern building had a sunken floor about 6.7 m long (Fig. 2). In the basal layer and the soil above it a significant assemblage of pottery was found, including many decorated sherds. The decoration of several of these sherds matches that of what is known as the N group (Glob 1945, 117). There was also an unusually large number of scorched stones and querns and worked flint etc. Ploughing with an ard could be seen to have taken place immediately after the building went out of use. The northern building had a sunken floor about 7 m long. The basal layer contained a more limited collection of pottery, including some decorated sherds which similarly were decorated in the style of the aforementioned N group and others. There were also some scorched stones and other stone and flint finds. As with the first building, ard-ploughing could be observed.

Immediately west of the building plot there was a pit whose contents included several quernstones. Four ^{14}C-dating of carbonized grain from the basal layer of the building plots have been made (AAR-4415 – 18) at the AMS Laboratory, Institute of Physics and Astronomy, Aarhus. The laboratory reports that the four results (3890±45 BP; 3885±45 BP; 3815±55 BP; 3990±50 BP) could all represent the same date. The weighted average age of the four results is 3874±24 BP (uncalibrated). With this dating (in respect of which we have to note that problems concerning the own age of the carbon are not relevant) we also have a precise dating for the use of pottery of the N group that is of interest in respect of the particular topic of this article, a destroyed barrow that was excavated about 70 m east of the two buildings, under the direction of the author. In this barrow (feature V) and immediately outside it were found many graves, all of them child-sized (Fig. 3). These small graves contained a variety of pots, several of which were, according to their decoration, probably contemporary with the pottery from the buildings. The barrow and its immediate surroundings must be assumed to have been in use as a cemetery for a longer period of time than the buildings found, and it is my understanding, based on their close chronological and geographical connexion, that some of these burials may have been made by the residents of these houses.

The barrow and its development

The barrow has been ploughed down for a very long time, and the local people could not remember any visible remains of a destroyed barrow here. By chance only parts of the ploughed-out barrow were subsoiled by the trench plough in 1996 (Fig. 7a). The excavation of the lost barrow with its many short stone cists and other types of small grave will be presented below.

The earliest barrow (mound 1) was fairly small and corresponded, in diameter, to many small barrows of the Single Grave Culture (Fig. 5a). This barrow was constructed on a slight prominence located on a surface sloping slightly to the east that runs for about 200 m to the south, east and north with no significant topographical variation and 100 m to the west, where the plain meets a distinct hill.

Mound 1 had had a diameter of about 9 m and it is possible that it was turf-built, although this could not be demonstrated with certainty. The height of the barrow was not great, probably about a metre, to judge by the small segment of its profile that was preserved at the foot of the barrow to the south in the main section (Fig. 4). Three graves were found in this small barrow.

Two remarkably small features might be regarded as traces of markers associated with mound 1. One hole was found about 3 m north of grave C while the second was found about 0.2 m west of grave P. Both were emptied and proved to be regularly circular at the surface with diameters of 14 and 15 cm respectively. Both had vertical, cylindrical sides and were 37 and 31 cm deep. Both were filled with the same loose fill as the make-up of this small barrow, and could have

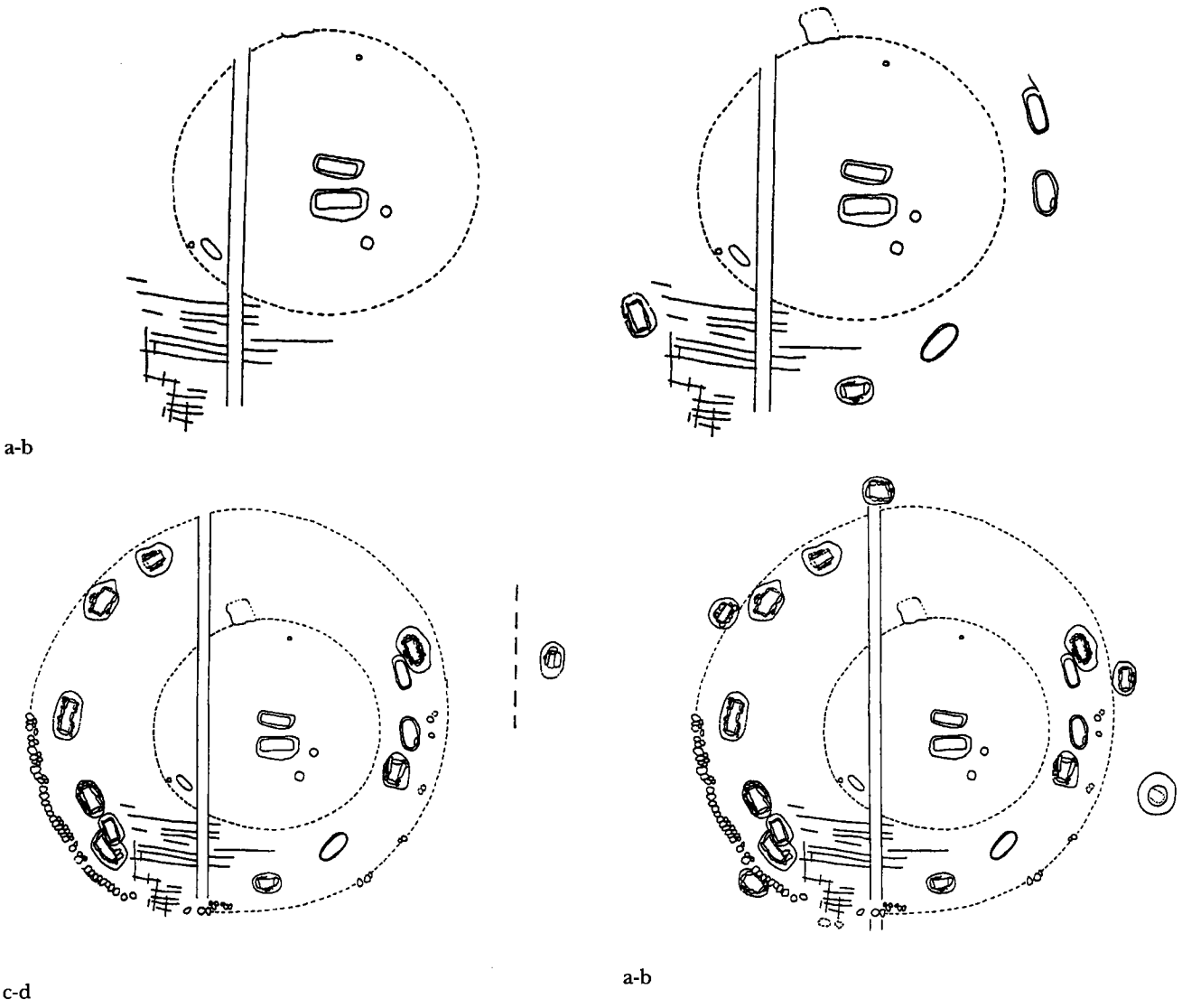


Fig. 5. Strandet Hovedgaard, feature V. The author's interpretation of the development of the cemetery with its many child-length graves. a) the first small barrow (mound 1) with its flat graves dug into the ground; b) later flat graves etc in the ground outside the foot of the barrow; c) larger barrow (mound 2) with a kerb and many new graves (short stone cists) dug into the ground; d) graves outside the foot of the barrow (including short stone cists) dug into the ground.

contained wooden stakes.

There were four graves to the east of the foot of mound 1, and one to the west (Fig. 5).

In the next phase the barrow was greatly enlarged (mound 2). Seven more children's graves were added and the extended barrow now covered a total of 15 graves (Fig. 5c). After this enlargement the barrow was one of the larger ones of the Single Grave Culture. On the basis of observations of the presence of the darker barrow fill in the surface, the preserved segments of the kerbstone chain and the occurrence of barrow fill in the main section, it has been established that it was about 16.5 m in diameter. It could not be determined how much of this larger phase of the barrow was turf-built. The height of the grave mound may have been quite substantial for a barrow of the Single Grave Culture, but it is of course impossible to provide an exact measure.

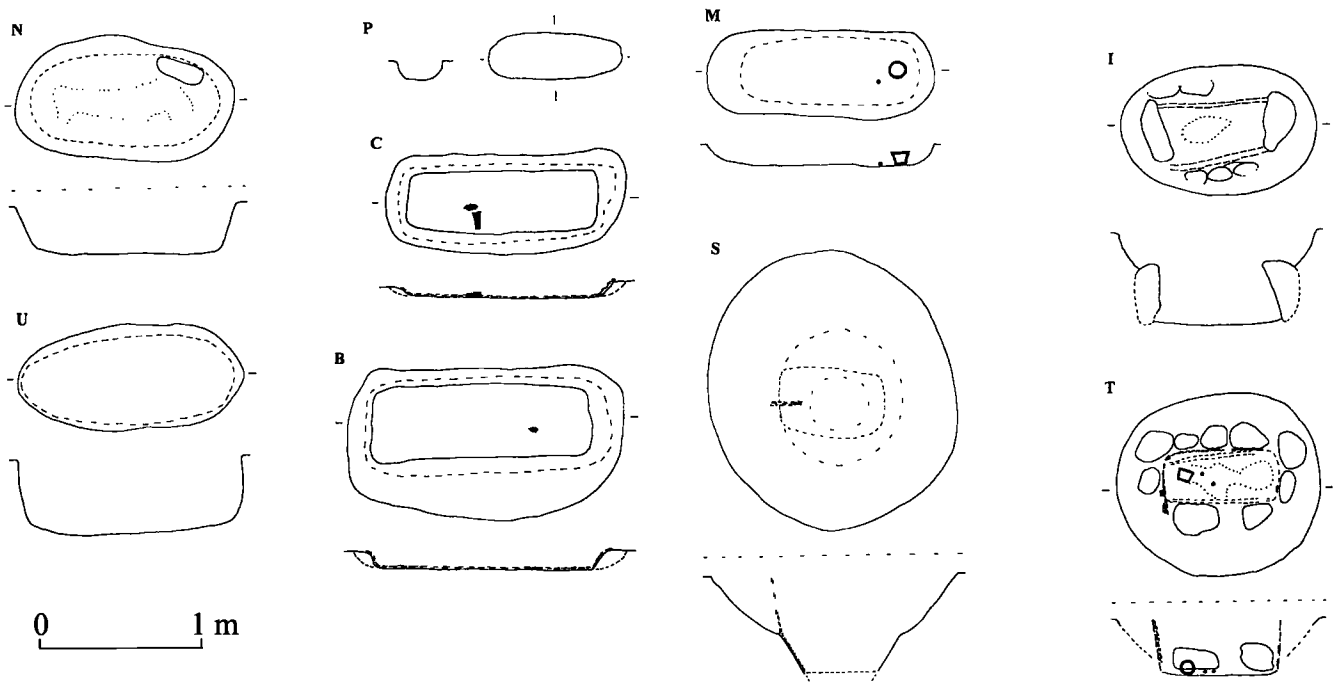


Fig. 6. Strandet Hovedgaard. Small flat graves and edged graves etc from the cemetery.

Unlike in the first phase, the new mound had a stone kerb ring (Fig. 7b). In the well-preserved segment to the south-west the construction of this kerbstone chain (designated "A") could be seen to consist of a circular trench with two closely spaced rows of selected, usually rounded, field stones. The outer circle consisted of stones up to about 40 cm long in any dimension. Immediately to the inside these were supported by smaller stones, most of them up to 20 cm long. The upper surface of both rings of stone was consistently at the same level, although the kerbstone chain as a whole sloped regularly up towards the north. Over the 8 m or so over which the kerbstone chain is largely preserved there is a height difference of 24 cm. One could not otherwise see whether both stone circles or perhaps only the innermost one had been covered by the make-up of the barrow.

The area of excavation extended about 5 m north of the barrow and 7 m south. There was absolutely no trace of any further extension of the barrow. On the contrary, substantial precipitation deposits were observed in the section both south and north of the barrow as well as at other places on the surface as a clear record of the location of the barrow edge. The total area excavated around the barrow measured about 500 m^2.

The concentration of graves was now tight in certain areas within the barrow, and five burials were made outside the mound. At a slightly greater distance one further burial was made towards the west. Altogether 21 graves, generally well-preserved, were found in the cemetery. All of the graves are illustrated and described in the appendix, while in what follows important features of the graves are highlighted in relation to the barrow phases.

The graves in mound 1

In the centre of mound 1 there were two E–W graves, B and C (Fig. 7c). The graves were of similar construction:

Grave B was an undisturbed grave with a carbonized wooden cover. In the eastern half of the grave tooth enamel from a child of 6–8 was found. There were no skeletal remains or grave goods.

Grave C was likewise an undisturbed grave with a carbonized wooden cover. In the western half of the grave there was a small flint axe and tooth enamel from a child of 3–5, but no skeletal remains otherwise.

These graves may not originally have been very deep, as the compression of the old surface can hardly have affected more than a few centimetres and the outer edges of the charred wooden covers rest on soil matching the old ground surface.

Grave C is probably the earlier, both because it is most centrally located within the small mound and also because evidence found at the surface indicates that the barrow was not raised until after this grave had been constructed.

At the edge of mound 1 grave P was found, appearing as a small feature to the south-west. No skeletal or dental remains were found, nor any grave goods.

During survey work in 1983, an experienced amateur archaeologist found a small battle axe. It is reported that this axe was found approximately on top of the ploughed-out barrow. Three years later the same amateur archaeologist found a small flint axe of darker flint on the central part of the barrow. These two stray finds of axes could derive from secondary graves in mound 1 higher up in the body of the barrow.

The graves outside of mound 1

Immediately north of mound 1 a small, irregular pit was found in the subsoil, barely 1 x 1 m and about 10 cm deep. This pit contained greyish-brown sandy soil with flecks of charcoal. The pit may have been constructed after the raising of the small barrow but before it was enlarged into mound 2. At the moment, we cannot really exclude the possibility that this pit may have been produced by rituals associated with burial.

South of mound 1 cultivation traces in the form of ardmarks sealed beneath mound 2 were found. These comprise traces of an approximately E–W ploughing and individual marks of a roughly N–W ploughing which crosses the other marks towards the west. The E–W ploughing appears slightly curved, possibly because of the presence of mound 1 as no ardmarks were found beneath this barrow. In this case, ploughing would have been done right up to the edge of the barrow. The ploughing was thus certainly done before the construction of mound 2 but probably after the raising of mound 1.

Four interments of different types (Fig. 6) and a short stone cist were apparently constructed before the enlargement of the barrow and may therefore, following their location, be regarded as burials outside the edge of mound 1 but associated with it. In none of these graves were skeletal or dental remains found, and grave goods were found only in graves M and J. The four graves were:

Grave I, undisturbed grave with large end stones and supporting stones.

Grave U, postulated undisturbed flat grave.

Grave N, undisturbed flat grave with a single supporting stone.

Grave M, undisturbed flat grave. In the southern end a small beaker (corresponding to Glob 1945, type P4) and a little north of it an amber bead.

Grave J, undisturbed stone cist (Fig. 7e). At the southern end was found a small beaker (corresponding to Glob 1945, type N3). No sunken barrow fill was found in the top of grave J (although the grave chamber was filled up by the infiltration of loose, fine-grained sand), and it therefore appears probable that it was constructed about the same time as the aforementioned graves outside of mound 1. Grave J is also stratigraphically earlier than grave K, as the pit of grave K cuts that of grave J. Since grave J is also the only stone cist that is reminiscent of the flat graves in the fill of the pit and its outline, and since it was also of an unusual form with, for instance, a paved floor, it can cautiously be presumed that it was the first of the short stone cists to be constructed.

The graves in mound 2

No graves from the central part of mound 2 were found. However, many secondary graves belonging to this phase were excavated. Altogether seven short stone cists were found along the inner edge of the barrow. No skeletal remains or tooth enamel were found in any of these, although there was a faint "shadow" in one of the graves, which are as follows:

Grave D, undisturbed stone cist. In the northern part lay a small beaker (corresponding to Globe 1945, type L3). Fragments of oystershell on the floor.

Grave L, undisturbed stone cist. No grave goods found.

Grave E, incompletely preserved stone cist. In the southern part stood a small beaker (corresponding

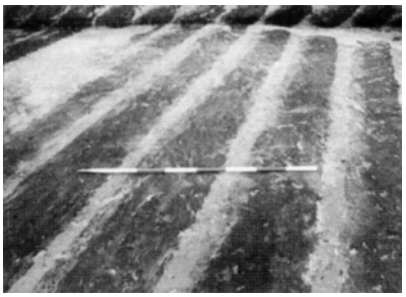


Fig. 7a

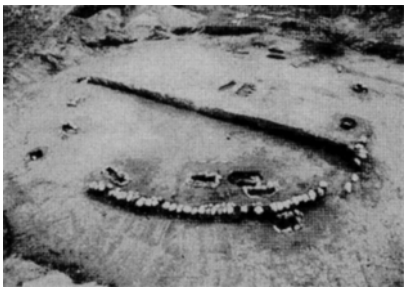


Fig. 7b

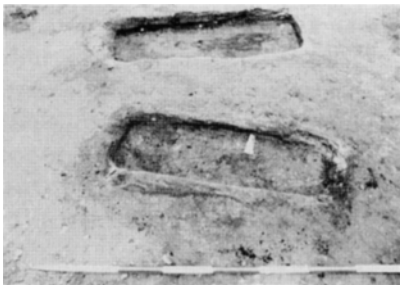


Fig. 7c

Fig. 7d

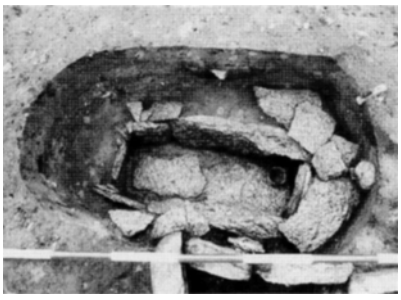


Fig. 7e

Fig. 7. Strandet Hovedgaard. a) The tracks of the modern trench plough in the north-eastern part of the barrow, feature V. Seen from the east. b) General view of the base of the barrow in feature V. Only the westernmost of the 21 graves lies outside the view. Seen from the south-west. c) In the foreground, grave C with its flint axe and tooth enamel from a 3–5-year-old. In the background grave B with tooth enamel from a 6–8-year-old. Seen from the north. d) In the foreground, part of the surviving kerb and behind it the short stone cist, grave H. Seen from the west. e) The short stone cist, grave J, built mainly of reddish granite, with the supporting stones exposed. Seen from the west.

to Glob 1945, type L6), which had evidently been partially damaged by the recent subsoiling.

Grave F, incompletely preserved stone cist. At the southern end stood a well-preserved small beaker (corresponding to Glob 1945, type P6) with an amber bead close by. In the sandy base was seen a faint greyish feature that further excavation revealed as the (possible) shadow of an individual in a crouched position. If so, the beaker stood by the stomach of the body and the amber bead in front of the neck. These details have to be treated with the greatest caution.

Grave G, undisturbed stone cist. In both the northern and southern halves was found a small pot (corresponding to Glob 1945, types P6 and O5).

Grave H, undisturbed stone cist. In the middle of the southern half lay four amber beads.

Grave K, undisturbed stone cist. At the western side of the south-western part of the grave stood a small pot (corresponding Glob 1945, type N3). Five amber beads lay practically in the middle.

The graves outside of mound 2

Outside mound 2 a total of five graves which had not been covered by any mound were found at various distances from the foot of the barrow. These comprise three short stone cists, one flat grave and one grave with a stone lining. No traces of skeletons or tooth enamel were found in any of these graves, which are the following:

Grave R, undisturbed stone cist. On the base at the southern end of the grave lay a pot (corresponding to Glob 1945, type N3) on its side, while further north at the same side (to the west) was an amber bead.

Grave O, undisturbed stone cist. At the eastern end

two small pots were found (corresponding to Glob 1945, types N3 and I3). An amber bead was found approximately in the middle of the south side.

Grave Q, undisturbed stone cist. At the eastern end of the grave stood a pot (corresponding to Glob 1945, type N1/3), about 1 cm above the base of the grave.

Grave S, undisturbed flat grave. No grave goods found.

Grave T, undisturbed grave with partially charred sides flanked by a supporting stone lining. In the northern half stood a small pot (corresponding to Glob 1945, type L6), and further south were two amber beads.

Grave V, incompletely preserved stone cist. In the southern part stood a small beaker (corresponding to Glob 1945, type I4). Right beside it were two amber beads. At the northern end of the grave stood a small beaker (corresponding to Glob 1945, type N4).

The sequence of grave-types

With the gradual construction of the graves and the enlargement of the barrow into mound 2, the base of the barrow provides a sort of horizontal stratigraphy extending from its original centre and spreading outwards rather like a ripple in a pond. As I understand it, the development of grave-types must have followed this sequence at the basal level of the barrow:

1. Shallow flat graves with charred wooden covers.
2. Deep or shallow flat graves, both types without traces of burning (and the grave with the large end stones).
3. Short stone cists.

There are naturally some questions that cannot be answered straightaway. Were all the interments in the base of the barrow made before the first stone cist was constructed? Was grave T, with its charred cist and supporting lining of stones constructed before the last stone cists or later, thus forming a fourth stage in the sequence above? In the following, the short stone cists are subjected to more thorough description and analysis.

The short stone cists

Nearly all the short cists in and around the barrow were extremely well built. They did not typically show haphazard approaches in their construction or the choice of materials. Some of the cists, however, were more harmonious than others, which may be because access to stone from the morainic landscape varied. The cist of grave J was particularly specially constructed, built as it was of cut stones of the same reddish granite in its long sides and for the capstone and — uniquely — with a paved floor, also in the same stone. It should be noted too that all of the cists were constructed in pits dug into the sandy subsoil.

In spite of intensive efforts no definite traces of skeletons or teeth were found in any of the stone cists. The sandy soil at this site does not preserve these organic materials over thousands of years.

The position of the stone cists in and beside the barrow

By far the most common orientation for Single Grave Culture graves is approximately E–W. For the construction of the solid stone cists, however, position in relation to the stone kerb of the barrow was decisive. At the edge there were graves which lay both within the kerbstone ring (aligned as chords in relation to the circular kerb) and outside of it (positioned as tangents to the circular kerb).

Nearly all of the small stone cists are linked to the rim of mound 2. One exception was probably cist J, which was early and, as noted above, is considered to have been a secondary grave outside of mound 1. Another exception may be grave V.

The position of the stone cists in relation to the kerbstones was roughly the same all around the barrow, but could best be studied in the reasonably well-preserved south-western segment of the kerb. Grave K was constructed like a chord in relation to the circuit at a distance of 1.2 m from the outer side of the supporting stone of the cist to the outer row of kerbstones. Grave H was similarly constructed at a distance of c. 0.6 m from the outer side of the supporting stone of the cist to the outer row of kerbstones. Grave G was constructed more or less the same way (albeit with the northern part of the grave turned a little more towards the centre of the barrow) with the kerbstones at a distance of c. 0.8–1.0 m from the outer side of the supporting stone of the cist to the outer row of kerbstones. Graves D, L, E and F were positioned in roughly the same way as these

examples.

Outside of the barrow, grave Q was positioned at a tangent to the foot ring, albeit with the supporting stone at one side partially covered by the kerbstones at a slightly deeper level. By graves O and R the kerbstones were not preserved, but the location of these cists must also have been tangential to the foot of the barrow.

A long way outside the barrow to the west was the cist, grave V. It could not be determined straightaway whether the alignment of this grave should be regarded as tangential to the kerbstones or if some other circumstances were decisive.

The general plan of the whole grave structure shows how the two earliest graves, flat graves B and C, were constructed approximately E–W. All the later graves at the base of the barrow structure, both flat graves of various types (including lined graves) and stone cists, were arranged according to their position in relation to the edge of the barrow-phase, which therefore governed nearly all of the alignments.

The plan of the stone cists

The outline of the cists appeared in most cases to consist of supporting stones which delineated a grave base of approximately rectangular shape (Fig. 8). A particular exception was grave Q, the outline of which was almost oval.

The dimensions of the cists varied somewhat, but all were consistent with child burials. The longest, grave G, was probably a double grave, as grave goods (pottery) were placed in each half of the grave and at the opposite sides. It was also very narrow in proportion to its length. Many of the stones in this grave sloped markedly inwards and thus exaggerated the impression of a distinctly narrow grave.

The external length of grave G was 1.38 m. This can be contrasted with the shortest cist, grave V, the external length of which cannot be given absolutely precisely but must have been about 0.70–0.75 m. The inner measurements of these two cists are 1.25 and 0.55 m respectively. The other cists range between these with external measurements from 0.93–1.17 m and internal measurements between 0.61 and 0.99 m.

The supporting stones of the cists

The number of supporting stones in the long sides varied considerably (Figs. 8-10). There were cists with an unequal number of supporting stones in the two long sides, although in most cases the numbers were the same. In the longest cist, grave G, there were five supporting stones in each side. In grave K there were four on either side and in grave R three. In the very short cists there were, for instance, two on each side in grave D. Finally there was only one stone on each side in grave V (Fig. 10).

In several cases there seems to have been a definite order in the placing of the supporting stones. They were often symmetrically positioned in relation to one another in respect of size. The largest stones were often placed at the wide end of the grave, and sometimes the position of the grave goods indicated that this was the head end of the grave. In the case of grave Q, however, which, as noted, differed somewhat from the other stone cists in form, the pot was untypically placed at the narrower end. In grave V there was a pot on the same side at each end, but since this cist was ultra-short the distance between them was inevitably small.

The short ends of the stone cists were also of varying construction. They usually consisted of either one larger or two smaller supporting stones. The largest supporting stones were often found in the short sides. In grave V a quernstone had been carefully placed as a supporting stone in the northern short side, the lower end of which had been broken off.

The upright supporting stones generally leant in towards the grave chamber. A few stones in the undisturbed cists were leaning at a considerable angle, others much less so. There was, however, only a small number of supporting stones in respect of which minor shifts in angle since their original positioning could be confidently discounted. Measurement showed that angles varied from 4 to 33 degrees. Grave G had the most extreme angles and appeared, as has been noted, very narrow in proportion to its length in respect of the position of the top of the supporting stones. Apart from this grave the angles of slope ranged from 4 to 18 degrees, and the mean measurement on ten stones was a 12 degree lean into the grave chamber.

The majority of the supporting stones of the stone cists had split surfaces facing into the grave chamber, while many — a slightly smaller number — were judged to have natural surfaces. In the case of cist F it

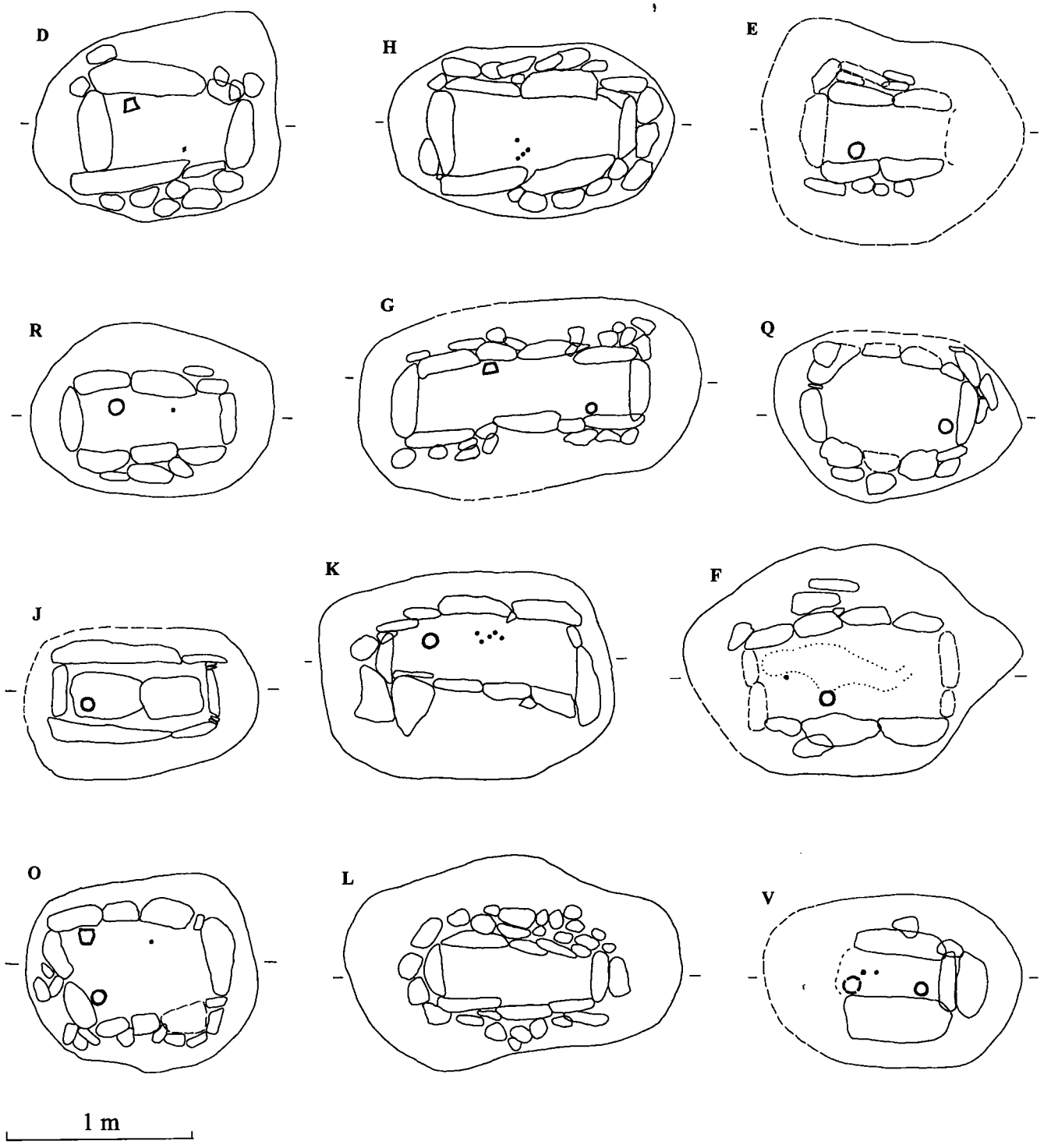


Fig. 8. Strandet Hovedgaard. Ground plans of the twelve short stone cists from the cemetery.

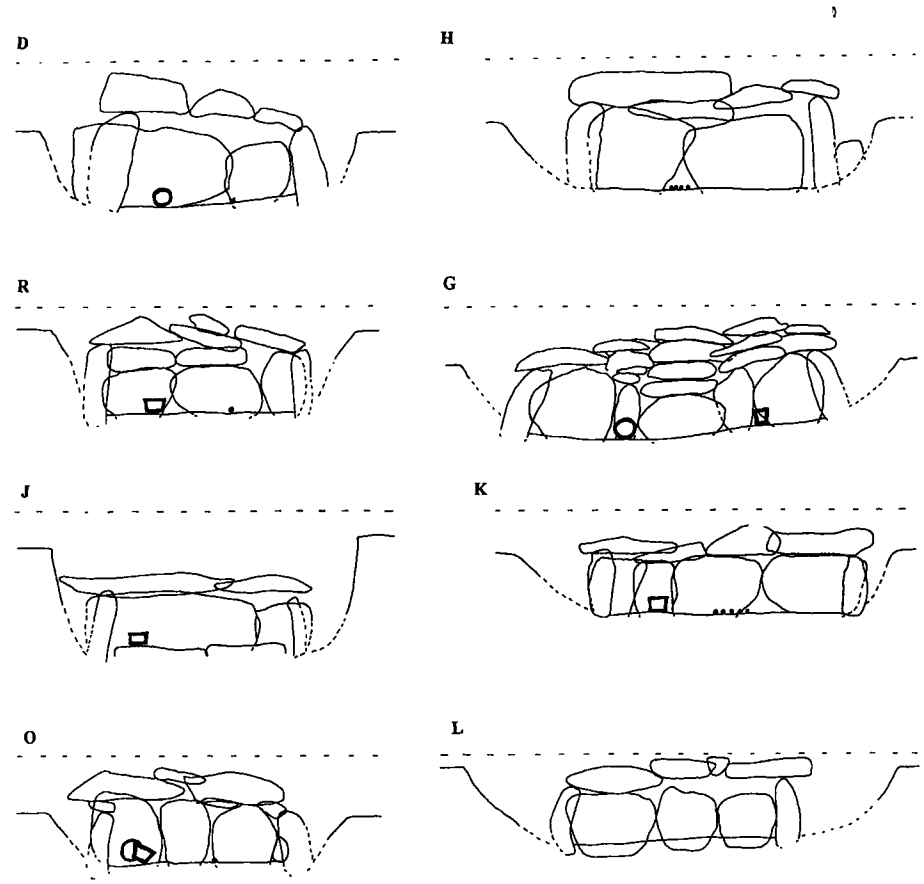


Fig. 9. Strandet Hovedgaard. Long sections of the cemetery's eight short stone cists with capstones preserved. One long side projected in. Scale c. 1:30. Drawn by Ingelise Faursby/John Simonsen.

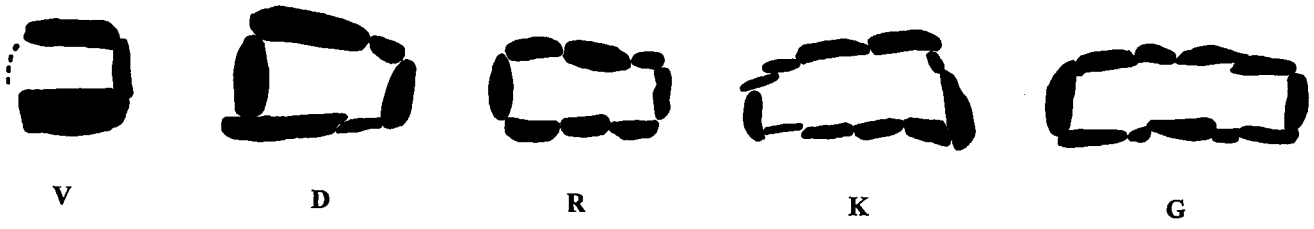


Fig. 10. Strandet Hovedgaard. Five examples of the number of supporting stones (1–5) in the long sides of the short stone cists.

was noted that what was evidently a split stone surface had been placed facing out from the interior of the grave, but this was the only exception to the norm.

In just one of the graves, stone cist L, all the upright supporting stones (with the possible exception of a small wedging stone) had split surfaces facing into the grave. Stone cist Q was the opposite extreme with no clearly split stones amongst the upright supporting stones. In most graves, however, there was a mixture of split and natural stone surfaces facing into the interior of the grave. In the long sides of the other ten stone cists there were therefore from zero to eight split and zero to four naturally shaped supporting stones. Slightly more characterful stones were often selected

for the short sides, and here the same ten cists had zero to two split and zero to two naturally shaped supporting stones.

The basal and capstones of the stone cists

The cists varied considerably in long profile. In eight of the twelve stone cists the capstones were found in situ. These will be described in detail here. In respect of the other four cists it will just be noted that they fell within the range of variation of the eight well-preserved specimens.

As has been noted, all of the stone cists were found in pits. The pits consistently sloped regularly down to a level around or just above the base of the stone cists. Grave J, with its steep pit, once again is an exception. In most of the cists no floor other than the greyish subsoil could be identified. Some organic material such as wood or hide may have been used in burial, however, which would not have been preserved in the sandy soil. Only in one cist, grave J, was a regular floor consisting of two thin stone flags found.

The depth of the pits beneath the top of the subsoil varied in the eight cases from 0.38–0.62 m, with a mean of 0.49 m (excluding grave J, which was not, however, the deepest). The longest pit was that for the narrow grave G, at 1.85 m. With this excluded, the others range from 1.26 to 1.78 m, with an average of 1.43 m.

There were no capstones protruding above the surface of the ground. The top of the capstones in fact lay generally just under the surface (again with a distinct exception in grave J, which lay 21 cm underground). The depth of the capstones beneath the ground surface thus varied from 2 to 7 cm, with an average of about 5 cm.

The height of the cists (measured from the top of the capstone to the base, and thus not to the deepest buried stone) ranged from 0.36 to 0.57 m. Grave J was 0.35 m deep measured to the upper side of the flags at the base. The average outer height of the seven intact cists was 0.44 m.

With all of the cists there were rounded stones placed against the outer side of the supporting stones, undoubtedly to stabilize the cists. These propping stones were found in varying quantities seen from the surface. In the case of grave J we dug down on the outer side in one small area where no propping stones could be seen from the surface. Here "strategically" placed round rocks were found supporting the cist deeper down.

With several cists only one row of upright supporting stones was found with the capstones placed directly on top of them. In some cases, however, horizontal or roughly horizontally positioned, relatively flat stones were put in between the supporting stones and the capstone, increasing the inner height of the cist or evening out to the height of the tallest supporting stone. Making-up stones of this kind were found in the short, compact, and very well-constructed grave D. In grave H the height of the supporting stones had been increased with one large flat stone, and in grave R with two larger stones side by side. Most striking in its construction in several layers was grave G. Here, around the centre of the cist, there were two layers of flat stone on top of the upright supporting stone. Above these in turn were two layers of capstone.

To construct the grave covers a large number of true capstones were used as well as smaller stones serving as props and true packing stones. In the cist with the most complex capstone-structure, grave G, about 20 stones were found in the capstone-construction in addition to the true capstones. In constrast there were also cists that had simpler capstone-structures with only a small number of stones in addition to the capstones.

In the case of the eight stone cists with preserved capstones, split capstones were the norm. The numbers range from eleven split capstones (and one further possible specimen) in grave G to one split capstone and two possibly split ones in cist L. In cists O and H there were three and two split capstones respectively, combined with one naturally shaped capstone in both cases.

The grave goods

The surviving grave furnishings from the whole monument were of considerable significance in view of the number of graves, but were very simple. The assemblage comprised amber beads, pottery and one flint axe. There were also the two stray axes from the barrow area. In one of the graves there were a few minor pieces of oystershell which could possibly have been secondarily deposited by animal activity, although oyster shells thought to have been votive deposits by capstones are known (Albrectsen 1936, 264). In the graves there may also have been organic

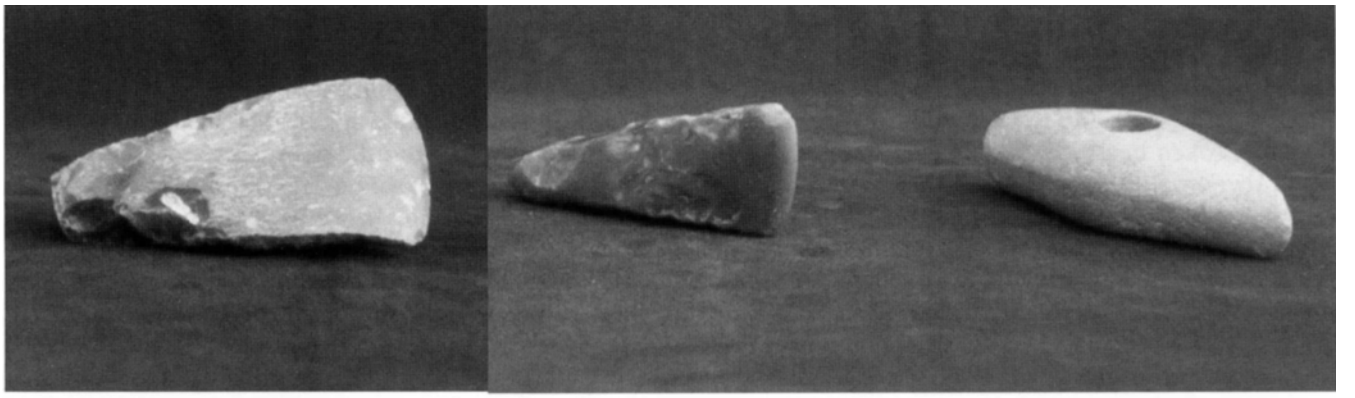


Fig. 11. Strandet Hovedgaard. a) The small flint axe with hanging edge from grave C. b) A small flint axe and a stone battle axe found at the top of the barrow site in 1983 and 1986 respectively.

material which has long since decayed. This could particularly have been the case in those graves that appeared empty of finds on excavation.

Axes

From all of the graves investigated, an axe was found only in grave C (Fig. 11a). This was made of light grey flint with a very characteristic, "hanging" edge, 56 mm wide. The axe is 115 mm long, and thin-bladed, up to c. 20 mm thick. It is polished on its broad faces for the whole length and on one of the narrow sides (opposite the hanging edge), while the other narrow side, which was marked by secondary chipping towards the butt, does not appear to have been polished.

As noted, two further axes were found a few years before the excavation that probably derived from higher graves, now lost (Fig. 11b). One of these is of dark grey flint with a similar slightly "hanging" edge 38 mm wide. This axe is only 97 mm long, and thin-bladed, up to 11 mm thick. The higher areas of the broad faces and the edge section in particular are polished, while the polishing on the narrow sides is limited to the area close to the butt. Around the middle of the side of the axe the surface of the flint has an especially shiny quality, possibly the result of wear from hafting.

The other axe, which was found on the ploughed-out barrow, is a battle axe of a "soft" brownish and very fine-grained stone. It is 111 mm long, 38 mm wide and 30 mm high. The shaft-hole is positioned in the middle of the axe and is perfectly cylindrical, 19 mm in diameter. The butt-end is decorated on both sides with a finely incised motif.

Of these three axes, only the battle axe is typologically diagnostic of the Single Grave Culture. In my view it corresponds most closely to Type H (Glob 1945, 38) with its convex upper side, plane lower side, and the position of the shaft-hole. Incised lines also occur on several type-H axes. In this light, this axe should belong typologically to the Ground-grave Period, the central period of the Single Grave Culture, although it might, of course, have spent some time in "circulation" before being deposited in the grave. In respect of the axe from grave C, it is to be noted that coming from the earliest grave in the barrow it must be older than this battle axe. In the case of the other stray flint axe, we should note that it is presumably later than its counterpart from grave C.

Amber beads

A total of 17 amber beads comes from eight graves. Half of these graves contained only a single bead, while in the other four the quantity ranged from two to five. Most of the beads are of the type of short, "tubular" beads. Their diameter ranges around 1 cm (varying from 0.6 to 1.5 cm). This type is represented in graves M, H, K, T and V (and evidently enjoyed a very long period of use with no obvious changes in fashion). A

slightly longer tubular bead was found in grave R.

Another type is a narrow, oblong amber bead provided with a perforation at one end. This is known from two graves, F and K. One of these was produced from a broken bead.

Only one grave contained amber beads as its only grave goods — its only surviving grave goods at least. In the other seven graves the amber beads were found in association with pottery. These are graves M, F, K, O, T, R and V, indicating that the custom of burying amber beads and beakers together is maintained throughout the main period of use of the cemetery.

Pottery

There is reason to make a bit more of the pottery vessels, as they can be inferred to take on gradually more and more importance in comparison with the axe-based chronological system of the Jutlandic Single Grave Culture. The total of 15 pots derives from twelve graves (Fig. 12), and all are decorated. Amongst the pots there are 13 that belong to the category of straight-walled beakers. The other two have a slightly convex side, faintly marked shoulders and an out-turned rim. Typologically these belong with the beakers of Type I and are decorated with pricking and cardium shells. Vessels of Type I are principally distributed in Himmerland, Salling, Fjends and central Jutlandic areas south of here (cf. Glob 1945, Fig. 59), and the find-combinations show that their production starts only late in the Single Grave Culture.

P. V. Glob divided the straight-walled beakers into seven stylistically defined main types according to their decoration (straight-walled beakers of Types H and K — which also include beakers of other forms — and Types L, M, N, O and P). Main types O and P, however, are not types as conventionally understood, as Type O comprises vessels whose decoration is a mixture of patterns from the other main types and P comprises straight-walled beakers that could not be assigned to any other type.

There are three straight-walled beakers (from graves D, E and T) that match best with group L, most similar to Types L3, L6 and L6 respectively. There are five straight-walled beakers (from graves J, K, O, R and Q) that belong to group N3 (one of them possibly N1). From grave V there is a vessel belonging to Type N4. A straight-walled beaker from grave G matches best with Type O5. A straight-walled beaker from grave M is best assigned to Type P4.

As a formal type, straight-walled beakers are known from the whole Jutlandic peninsula and are the most frequently used type of burial pottery of the late Single Grave Culture, while the forms of ornament used often have more limited areas of distribution. According to the above classification, six straight-walled beakers can be assigned to Type N, the principal concentration of which lies in the area around the central, southern part of the Limfjord, i.e. Salling, Fjends and Himmerland and the areas immediately to the south of this. In addition, three of the straight-walled beakers could be assigned to Type L and three to Type P, both of which are found in Jutland generally. Several of the straight-walled vessels from Strandet Hovedgaard are decorated with very wide, flat collars (Fig. 13), which are also typical of the areas mentioned above around the southern part of the Limfjord, and of areas slightly to the west (Glob 1945, 120).

It must briefly be noted in connexion with the distribution of pottery-types in Jutland that we may lack finds from areas with heavier types of soil. These areas have, as a rule, been subject to long-term intensive cultivation which could have destroyed grave finds with straight-walled beakers of the types discussed. This problem is probably most acute further to the south in the eastern parts of the Jutlandic peninsula. On the Salling peninsula by the Limfjord there are also significant areas with more or less distinctly clayey soil. But here the problem of the geographical representativity of large areas is counteracted by the interspersal of lighter soil-types that have in several cases remained heath far into historical times. And as several distribution maps show (Glob 1945), there are in fact many finds of straight-walled beakers from the Salling peninsula.

The vessels and their grouping

As far as the relative dating of the 15 beakers is concerned, 13 of which are from short stone cists, the find associations in the cemetery reveal certain new possibilities. From the sequence of construction of the graves in and around the barrow given above could support a certain relative chronology of the pottery related to the chorology of the graves. It appears that

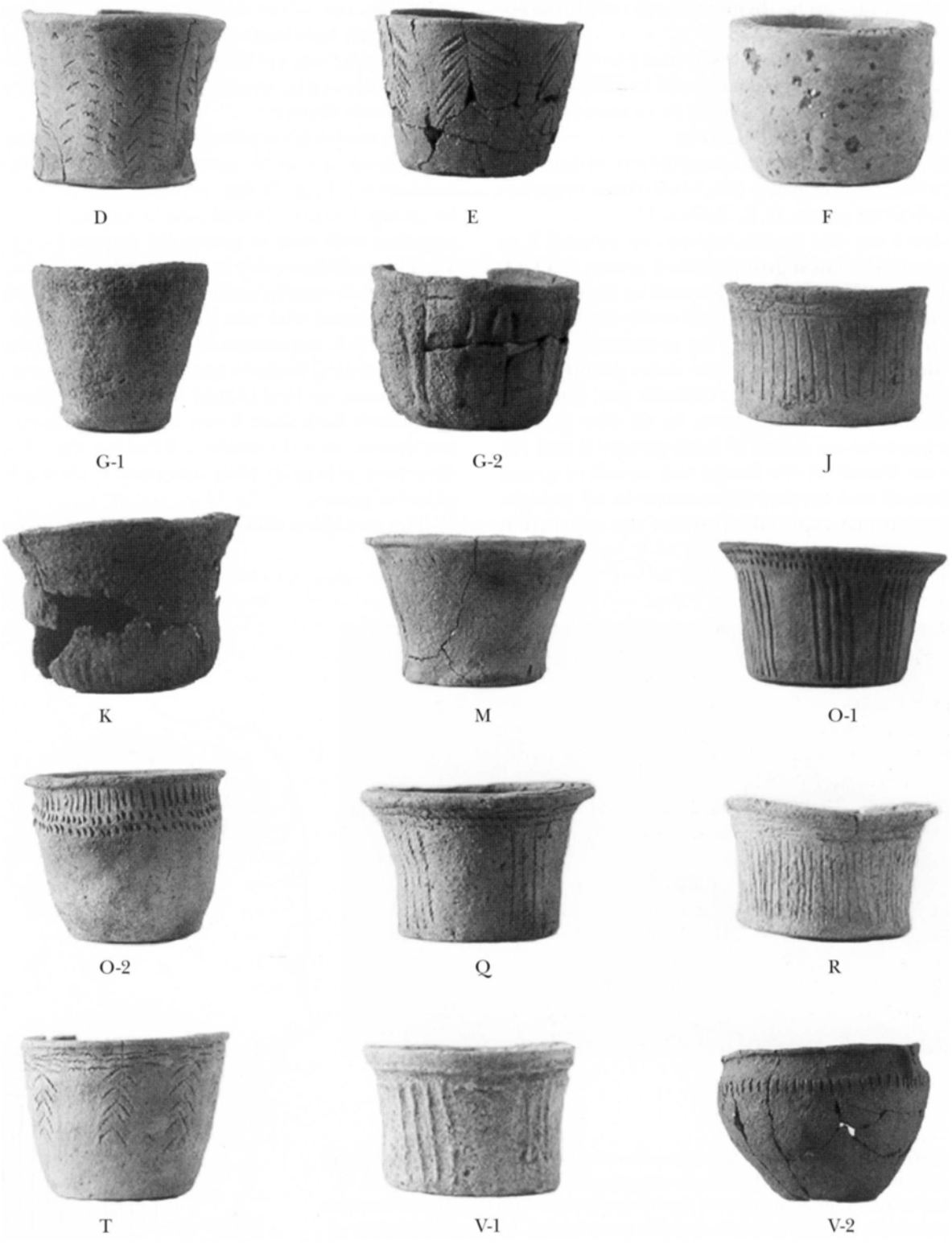


Fig.12. Strandet Hovedgaard. From 13 of the 21 small graves in the cemetery came a total of 15 small pots of the late Single Grave Culture. In some of the graves (see the letters) there were two pots.

the pottery finds can be divided into three chronological groups (Fig. 14).

I see the vessels from graves M and J as belonging to the earliest group (I) from mound 1 and the graves that appear to have been placed in connexion with this outside the rim of the barrow.

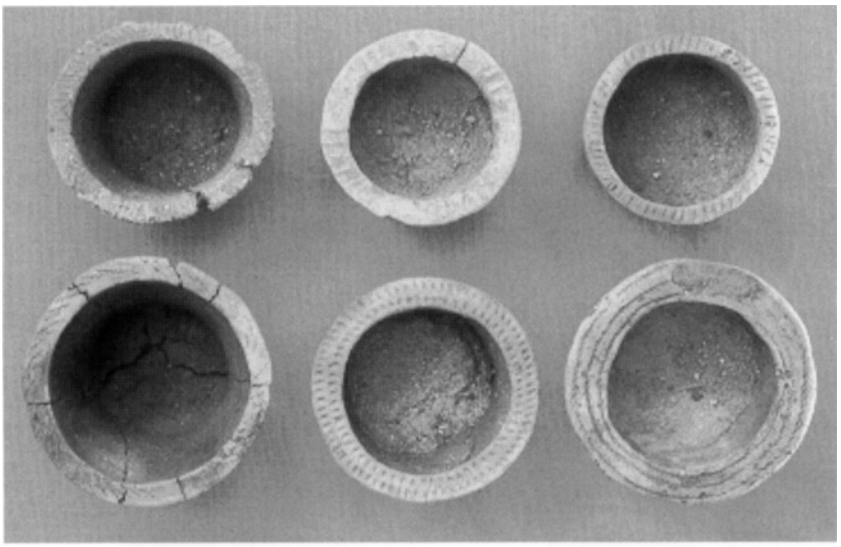
Several graves from the inner periphery of mound 2 belong to the middle group (II), which thus comprises the vessels from graves D, E, F, G and K.

Finally, I see the graves outside of mound 2 as belonging to the latest group (III) of graves R, O, Q, T and V. Grave V, however, is located so far from the barrow that it is not certain that it really does fit in to the horizontal stratigraphy of the cemetery.

The decorative elements in the three groups specified appear not to vary in any definite way. Cardium impressions occur, for instance, in all thre groups. Feather patterns are found in both groups II and III, but are not found on the (only) two vessels of group I. Horizontal and vertical lines occur in all groups. What by contrast especially justifies the separation of the groups is the different use of the decorative elements in building up the patterns and a degree of formal variation in the group of straight-walled beakers, which can be straight but also concave or convex to a certain degree.

If we use Glob's typology, which combines form and decoration, it can be noted that the straight-walled beakers of Type N are represented by one vessel in group I (grave J) and one in group II (grave K) together with four in group III (graves O, Q, R and V). This could possibly be due to a long period of use of these fine vessels, such that the date of production is not coequal with the period of deposition. Here, however, it is important to appreciate that sherds of straight-walled beakers are rarely found at excavated settlements, so that if they were in "circulation" for a relatively long time it can hardly have been on the settlement sites themselves. What we can observe is therefore primarily their association through deposition in graves.

The straight-walled beaker in grave M should be



a

b

Fig.13. a) Strandet Hovedgaard. Straight-walled beakers with their typical flat and decorated collars. Upper left, beakers from graves R, V and F, lower graves M, O and Q. In several of the beakers were found remains of soil, which future analyses may allow to indicate their possible contents when buried. b) The distribution of straight-walled beakers of type N3. The principal area is clearly in the same area as Strandet Hovedgaard (based on Glob 1945),

older than grave J as the latter grave, as indicated, is probably the first in the series of short stone cists in the cemetery. The decorative patterns on the straight-walled beaker in grave J with closely spaced vertical striping recur in grave K and again in grave R. This type therefore occurs in all three groups.

On the other hand, straight-walled beakers with patterns including vertical striping broken by undecorated fields appear to be introduced as a new element in group III. This could, then, indicate that this decorative motif is later than the straight-walled beakers with close vertical striping of Glob's N-types. Otherwise the finds from the barrow also indicate that the two beakers of Type I (graves O and V) occur very late — whatever the actual case, here they occur only in group III.

It is evident that despite the large number of graves there are no grounds for asserting that the development sketched here at the cemetery (feature V) at Strandet Hovedgaard can serve as a general representation of the North Jutlandic areas such as Salling, Fjends, Himmerland and the areas immediately to the south (Fig. 16). In my view, however, the development indicated at this site appears to be corroborated by the studies of the Single Grave Culture pottery carried out a number of years ago (Hvass 1986). The straight-walled beakers with vertical striping interrupted by undecorated fields beneath horizontal lines match very closely with her latest ceramic phase (IV). Straight-walled beakers with vertically oriented, feather-like motifs occur in her penultimate ceramic phase (III), and two of these occur in cemetery group II at Strandet Hovedgaard.

There thus appears to be a certain agreement in stylistic development with the ceramic phases proposed by Lone Hvass. In respect of the Single Grave Culture, there is no doubt that there were virtually synchronous shifts in decorative style over considerable areas of Jutland (cf. also the discussion of settlement pottery: Simonsen 1987). The possibilities that many recent excavations of grave finds of the late Single Grave Culture in particular offer have not as yet been exploited to improve the chronological framework or for the construction of a truly pottery-based chronology.

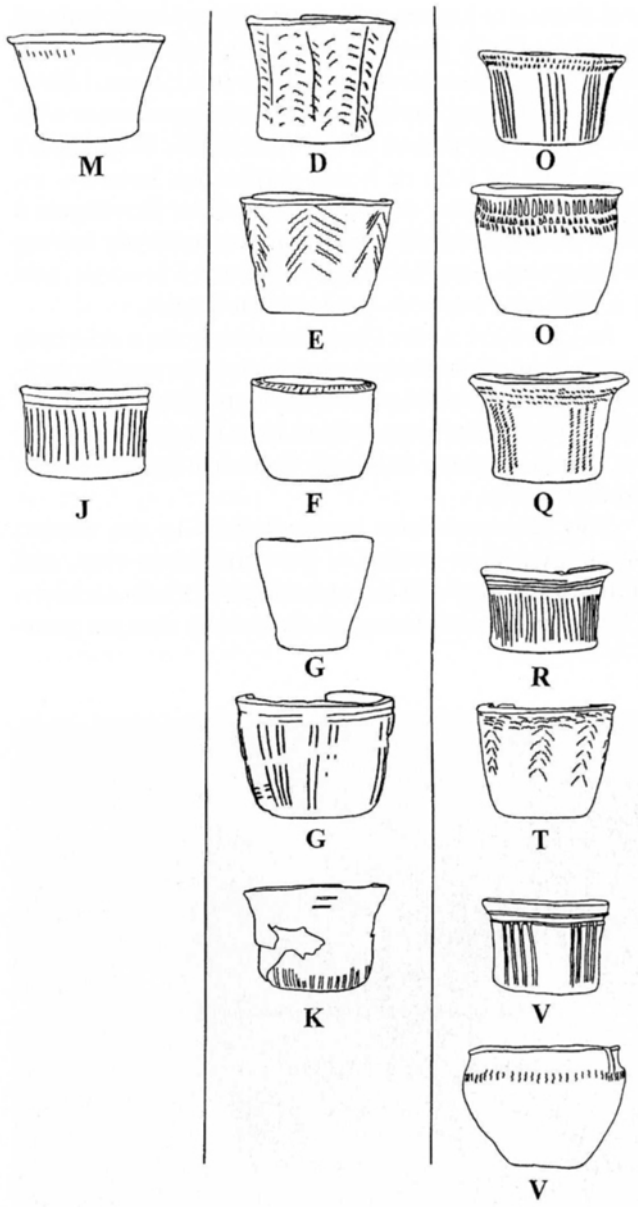


Fig. 14. Strandet Hovedgaard. Pottery from the cemetery divided into three groups, the earliest to the left, the latest to the right.

Short stone cists in North Jutland

Body-length, closed cists built of stone occur in several periods of Danish prehistory. Amongst the oldest are the cists of the Single Grave Culture and Dagger Period constructed of flat stone slabs. While the stone cists later in the Dagger Period are found mostly in northern Sealand, the late Single Grave Culture and early Dagger Period cists are found most frequently in North Jutland. The short stone cists that were descri-

bed above are known principally from North Jutland in Denmark. By short stone cists is here understood cists with an interior length of no more than 1.40 m (measured along the central axis), in agreement with P. V. Glob's discussion of the cists (1945, 197). Glob's lower limit of 0.65 m is not applicable, however, as, for instance, at the cemetery of Strandet Hovedgaard there are even smaller cists which manifestly belong to this group. Interior lengths below 0.5 m occur, and it is difficult to specify a minimum length.

As I perceive it, the short stone cists are a relatively simple form of cist that was only meant for smaller individuals, which would normally mean children. On the whole, these cists seem only to have been constructed for one individual, although there are indications of double graves.

The museums have intermittently in the distant past undertaken studies of the short stone cists, and some plans may still lie unnoticed in their archives. The earlier investigations of short stone cists are generally affected by the fact that very small areas were excavated, with the result, amongst other things, that it is only rarely determined whether or not the cists were associated with grave mounds. An example of this is an excavation at Strandet (Fig. 15), undertaken by the local road engineer C. Sørensen in 1933. This has left us one photograph and some summary information.

Fig. 15. This short stone cist was found at Strandet in November 1933. Its interior length is given as 0.95 m. In the grave can be seen a straight-walled beaker (VSM 160B). Photographer unknown.

It is fairly certain that most of the then extant investigations were included in a fundamental study of the stone cists of the late Single Grave Culture from the beginning of the 1970's (Sterum 1976). This work contains a comprehensive catalogue of the stone cists of the Single Grave Culture, although at this time there were only a relatively few general plans of barrow sites with short stone cists.

After the more extensive uncovering of complete barrow sites became possible with the aid of contractors' machinery, several excavations have been added through which complete barrow sites have been examined. These excavations provide a gradually more secure picture of several aspects of the occurrence of these short stone cists in relation to burial mounds.

There is thus good reason to offer a new overview of the distribution of short stone cists below, their location in cemeteries and their dating, including new evidence from the last quarter-century in particular.

Recent excavations

Here we shall first go through the most important features of several of the more recent excavations of short stone cists in North Jutland (Fig. 18a-f.), most of which are unpublished.

At Skringstrup, Skals parish, excavations were carried out at single site at intervals of several years between 1930 and 1971 (Fig. 18c). First small excavations in parcels were undertaken (by Erling Albrectsen amongst others), and finally a full area excavation by Jens Vellev in 1971. It appears probable that this site involved a lost barrow of at least 15 m diameter, although traces of the fill of the barrow itself could not be directly identified (Vellev 1971; 1972; 1975). A total of 17 graves was found, 13 of them stone cists, with the position of the graves at the edge of the barrow particularly clearly visible, although there is not full clarity over the interrelationships and stratigraphy of the features located more centrally. The grave-types at this site comprise short stone cists, flat graves and lined graves, most of them child-sized.

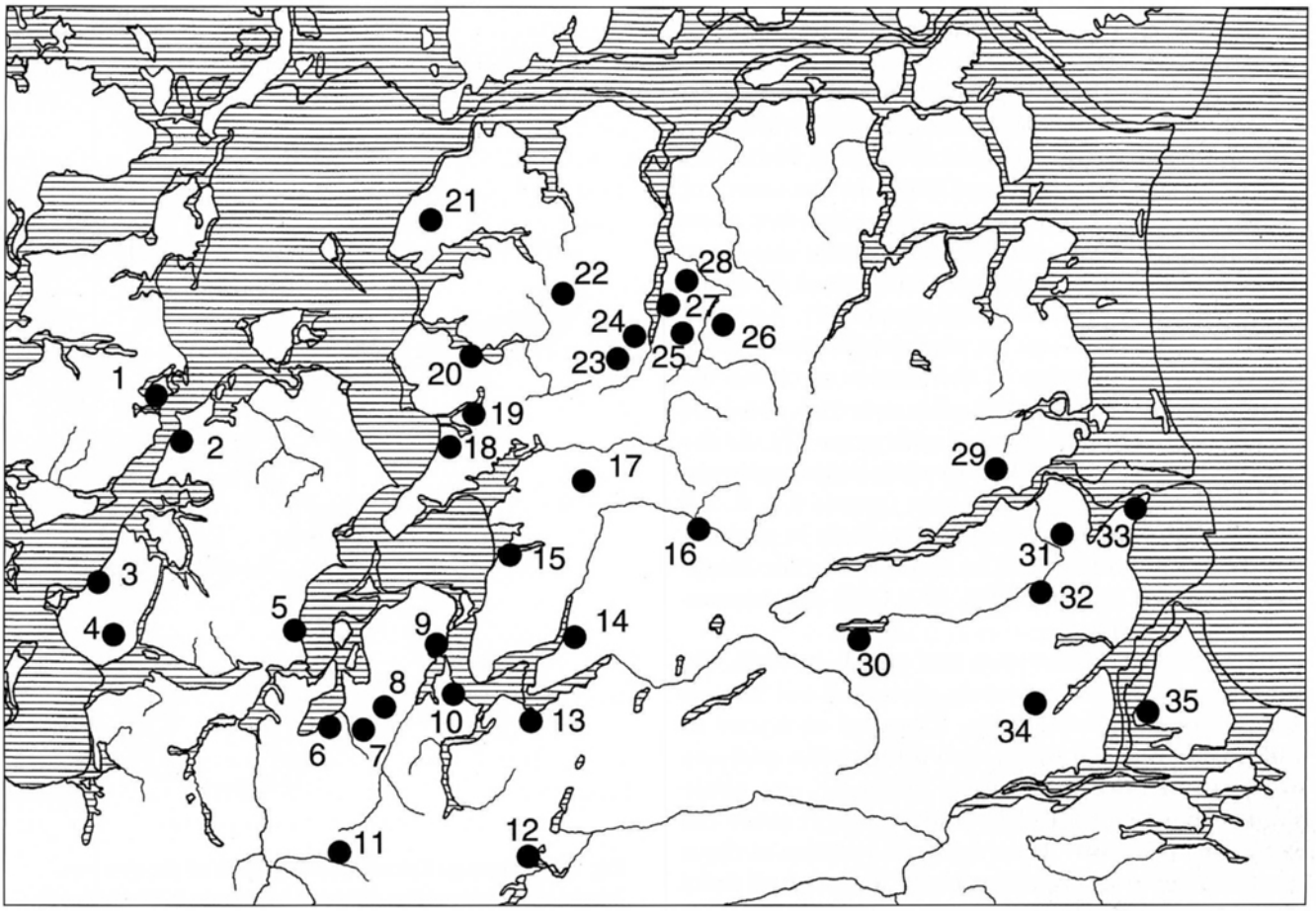


Fig. 16. Important cemeteries with short stone cists. 1) Fårup, 2) Møllegård, 3) Ålbækparken, 4) Lem, 5) Resengaard, 6) Kobberup, 7) Thorsøgård, 8) Ajstrupgårde, 9) Strandet Hovedgård, 10) Tårupgaarde, 11) Engedal, 12) Nonbo, 13) Kjølsen, 14) Skringstrup, 15) Gjørup, 16) Hvilsom, 17) Østerbølle, 18) Foulum, 19) Fandrup, 20) Fredbjerg, 21) Kirkebjerggård, 22) Vesthimmerlands Flyveplads, 23) Slemstrup, 24) Stenildvad Mark, 25) Hovknold, 26) Tøttrup, 27) Lynnerup, 28) Skivum Østerkrat, 29) Merritsholt, 30) Glenstrup, 31) Langvad, 32) Toftelund, 33) Klattrup, 34) Mejlby og 35) Voer. Drawing by Hans Erik Christensen and John Simonsen.

The short stone cists are the predominant type, and are amongst the first examples of this type described (Albrectsen 1936; 1941; Becker 1936). The finds as a whole consist of amber beads and 16 pots, mostly straight-walled beakers.

At Langvang, Nebstrup, Vindblæs parish, in 1982–83 Ole Schmidt directed the excavation of a severely ploughed-out barrow with eight short stone cists and two adult-length cists (Fig. 18e). The barrow was situated on the gently sloping southern side of a hill. There were no certain traces of a central feature and the majority of the cists were at the edge of the barrow. There was generally no trace of the bodies buried, although grave goods were found in several of the graves. In graves a and g (the two adult-length cists) were found straight-walled beakers. Straight-walled beakers were also found in graves k, u and x. Grave t contained a round-bodied beaker and the other graves were void of finds.

A few kilometres to the east, at the site of Rosengård, Udbyneder parish, a short stone cist was excavated by Ernst Stidsing in 1992. No grave goods nor evidence of the individual buried were found. At Klattrup in the same parish in 1955, O. Warthoe Hansen

had excavated a short stone cist which contained a pot (Sterum, 1976, 95).

At Glenstrup, Glenstrup parish, Svend Søndergård excavated the remains of the monument "kvindehøj" (the woman's barrow) (Sterum 1976) (Fig. 18d). This barrow survived to a height of 0.6 m. In the centre of the barrow a timber structure with earth-fast posts was found at the base of the mound. Some way above the base of the mound, in the undisturbed fill of the barrow, a log coffin was found (grave 17). Approximately NNW of this was an adult-length lined grave (grave 16). At the edge of the barrow were two log coffins (graves 12 and 13) with external charring (as was probably also the case with grave 17). At the edge of the barrow there was an adult-length stone cist (grave 8) and six short stone cists (graves 4, 5, 6, 7, 9 and 11) and three uncertain graves. Only in grave 12 was there a pot, which can be dated to the late Single Grave Culture (Sterum 1976, 67). Only one barrow-phase was identified.

At Toftelund, Enslev town and parish, in 1982, Ole Schmidt excavated a severely ploughed-out barrow with, amongst other things, a central structure in addition to one flat grave with a log coffin and one stone cist of uncertain length (grave e), one adult-length stone cist (grave ag) and one short stone cist (grave af.) (Fig. 18b). Here again no remains of those buried in the stone cists were found, although all three cists contained a straight-walled beaker.

At Lynnerup, Skivum parish, a lost barrow was excavated under the direction of Erik Johansen and Egon Hasselgren in 1983, containing a large, centrally placed, stone-built burial cist with its entrance to the south, of the later Single Grave Culture, and several stone cists around the edge (cf. Hansen 1996). Various artefacts were found in the chamber that must come from burials, including 14 pots, most of them straight-walled and decorated with elements such as toothed pegs, plied cord, cardium shell, and vertical moulded lines. There were also two battle axes, a tanged wedge, 20 pieces of amber, and more. South-west of the passage of the chamber were two stone cists (labelled A6 and A5) which were apparently built together. The western cist contained two straight-walled beakers and amber beads, the eastern one a pot and amber beads. East of the chamber were found three stone cists, one of them adult-length (A3) with a few amber beads, the other two short (A2, interior length c. 0.66 m and A4, interior length c. 0.7 m). Both of these were unfortunately void of finds, but a dating to the late Single Grave Culture seems probable on the basis of a general assessment of the finds from the barrow.

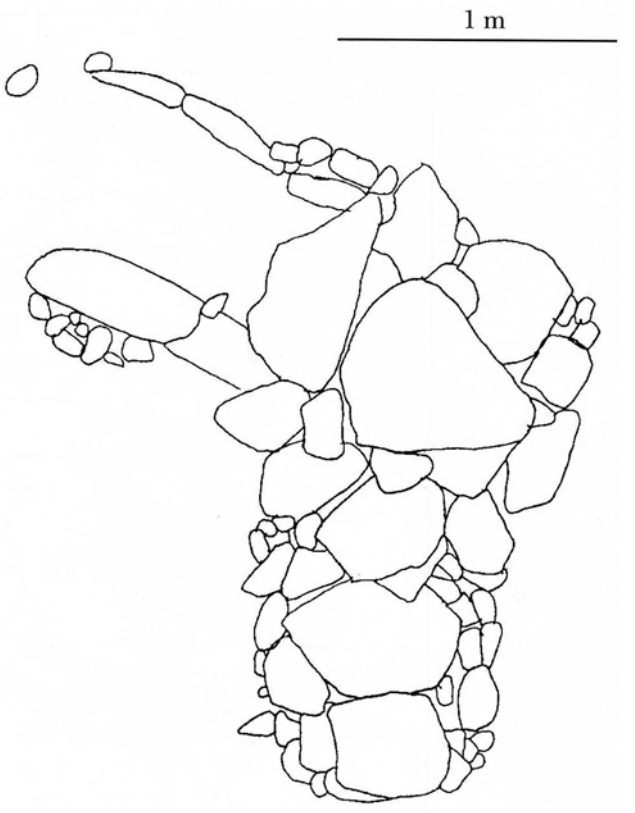


Fig. 17. Lynnerup. Excavated 1983. Plan of the two conjoined short stone cists (A5 and A6), scale 1:50. Drawn by Egon Hasselgren/Erik Johansen.

At Vesthimmerlands Lufthavn in 1980, Mogens Hansen excavated a lost barrow with a timber-built chamber with its entrance to the ESE in the centre of the mound. This chamber is dated to the Ground-grave Period (Hansen 1996). Three further graves were found in the barrow, the southernmost of which beyond the edge of the earliest phase of the mound was a short stone cist (labelled A5). Two amber beads were found in the cist, which had an interior length of about 1 m.

At Kirkebjerggård, Malle parish, in 1957, the south-western part of a ploughed-over barrow was excavated (Fig. 18f.). In 1970–71 Jens Vellev led further investigations of the barrow site (Jensen & Vellev 1971). The barrow had three phases, an earliest mound 1 about 7 m in diameter, followed by mound 2 about 12 m in diameter with a stone footring, and finally mound 3

with traces of a line of kerbstones and an outer diameter of about 16 m. The central grave, grave b, was an E–W oriented charred cist of limewood, buried within the ground. The excavator interpreted it as a double grave. To the east were found surviving teeth from a child of about 10. A beaker and an amber bead were also found here. To the west were the teeth of a baby of 3–6 months and a straight-walled beaker and an amber bead. East of this, in grave n, there were the preserved dental remains of a child of barely one year together with seven amber beads and the remains of a pot. In graves c, j and m (an uncertain grave) and the possible edged grave 1 no grave goods nor traces of bodies were found. In a flat grave, d, were dental remains and possible fragments of a pot that were not lifted. In the short stone cist e, there were no remains of either the deceased or of grave goods. All of the graves mentioned so far were dug into the ground beneath mound 1. From mound 2, flat graves i and k produced only a pot from grave i. In the short stone cist, f, there was a pot. In the partially preserved grave q there was an amber bead. A large stone cist of the North Jutlandic type was later constructed in the centre of the barrow. This yielded a battle axe and an amber bead.

Barrow 3 may be of the Late Neolithic, as two fragments of a pressure-flaked flint dagger were found there to the south-west. Outside of this mound were two stone cists of the Roman Iron Age.

At Engedal, Daugbjerg parish, Ole Faber examined a protected barrow that had to be removed in advance of roadbuilding in 1977. As well as central features the edge of the barrow included, amongst other things, two short stone cists that had been constructed one immediately above the other.

At Møllegård, Glyngøre parish, in 1999, Agner Nordby excavated a short stone cist (Fig. 19). The interior length of the cist was very small, only 0.46 m along the central axis. The cist was constructed relatively deep within the ground, with the underside of the stone plate of the cist at the bottom about 80 cm down. This short stone cist was also remarkable in that several layers of hand- to head-sized stones were found above the flat capstone, while the grave had possibly been constructed on a slight natural rise in the terrain. A larger area was opened up but no sign of a barrow could be found.

Short stone cists in North Jutland

The geographical distribution of short cists is not the product of deliberate research interventions in particular areas or of special types of construction work that could introduce distortion into the distribution pattern. At the same time, the number of cists is now sufficiently high that the distribution is reasonably representative geographically of the original pattern.

Figure 16 shows that the principal area of distribution is a definite zone within North Jutland, primarily Himmerland, Salling-Fjends and the areas immediately to the south. It is also appears that it was particularly within certain districts in this zone that the short stone cists were constructed.

There are clusters of the short stone cists in the areas around Mariager and Randers Fjords, and Glenstrup Sø. There is also a cluster in the areas east and west of Halkær River, which debouches at Sebbersund. Up along the coast of Himmerland to the west there are several instances of short stone cists. There are occurrences by the Lerkenfeld River and Simested River, and several instances around Hjarbæk Fjord, which is part of the central Limfjord area. Finally there is a number of sites in the west of Salling and in the area south-east of Tastum Sø.

In a large part of north-eastern Himmerland, meanwhile, no securely dated stone cists of the Single Grave Culture or Dagger Period are known. This area is not completely void of finds, however, as some excavated examples of short stone cists are known from Suldrup, Rostrup and Gudum parishes.

It must be noted that short stone cists are known in Djursland too, as at Svampekæret, Rimsø parish, where a stone cist (with no grave goods) with an interior length of c. 1.1 m was excavated in 1968 by Niels Axel Boas below the kerbstone ring of a barrow covering an early Late-neolithic grave. Another excavation in the north-east of Djursland, undertaken by Bo Madsen and Niels Axel Boas in 1970, was at Kastbjerg, Kastbjerg parish. The short stone cist found here, with an interior length of 0.65 m, had no grave goods but very probably belongs to the group of cists under discussion here as its method of construction, dimensions and position at the edge (in this case of the entrance area to a passage grave) corresponds exactly with the classic short stone cists. Finally a cist from Rønde has been assigned to the type of stone cist under discussion (Becker 1936). This one was unusual

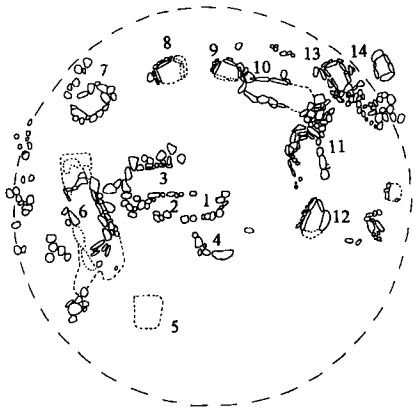


Fig. 18a. Important cemeteries. Hvilsom (a). Excavated (mostly) 1965. Sterum (1976) noted that to the west were found possible remains of a stone kerb ring and that both of the stone cists to the north-east might have been outside the barrow, which he suggested could have been about 10 m in diameter.

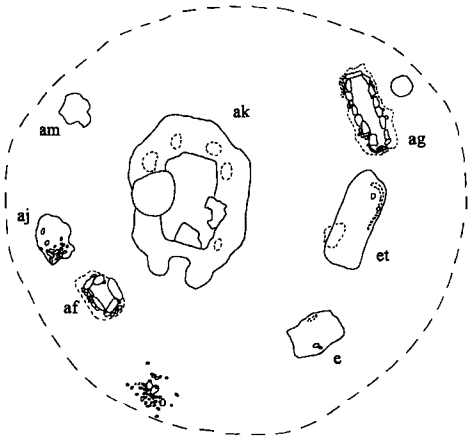


Fig. 18b. Toftelund. Excavated 1982. The barrow fill was identified and its diameter, in which only one phase could be recognized, was c. 12–13 m.

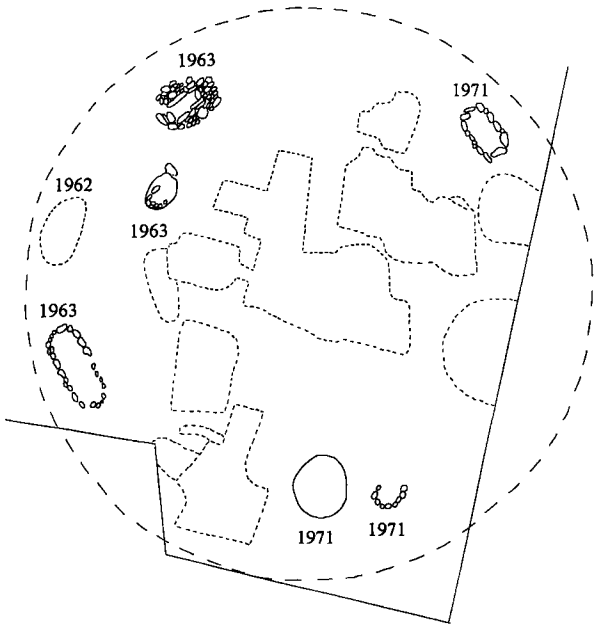


Fig. 18c. Skringstrup. Several short excavations at this classic site between 1930 and 1971. No barrow fill was recognized, but Vellev (1975) indicates the possible outline of a barrow about 15 m in diameter. The earlier pits, in which short stone cists and other types of graves were found, and a grave excavated in 1962, are marked with a closely stippled line.

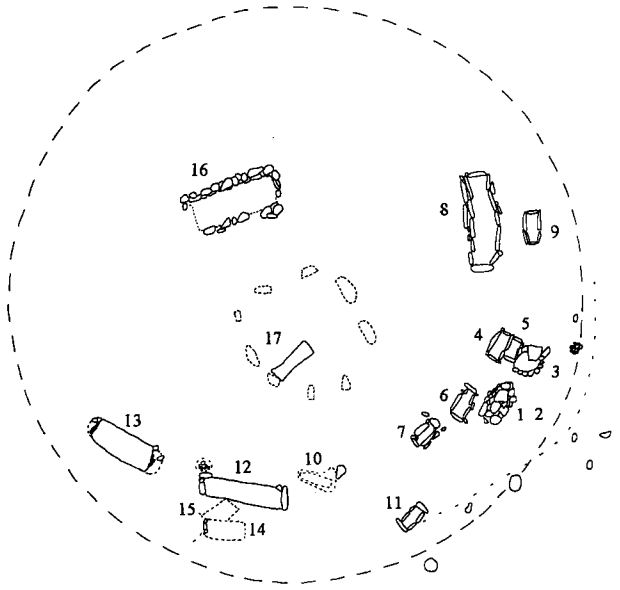


Fig. 18d. Glenstrup. Excavated 1960. No barrow fill was identified, but the northern and north-western area was not excavated (the limit of excavation is not marked). Stones that could have come from a kerb ring were found to the south-east.

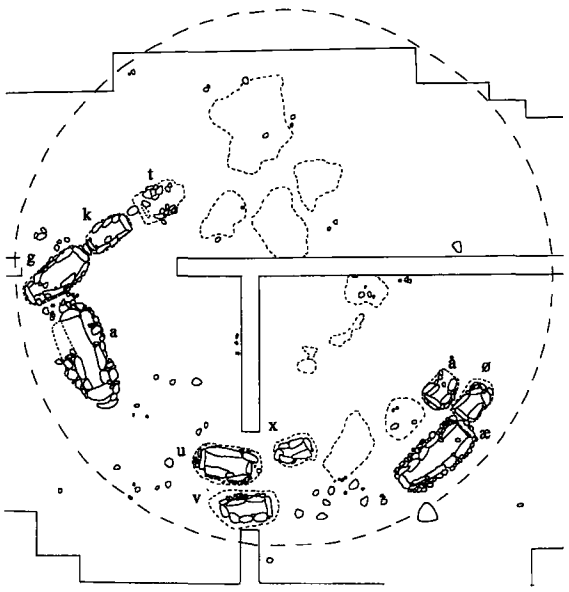


Fig. 18e. Langvang. Excavated 1982–83. The fill of the barrow was recognized but its limits were not given by the excavator and no central grave was found.

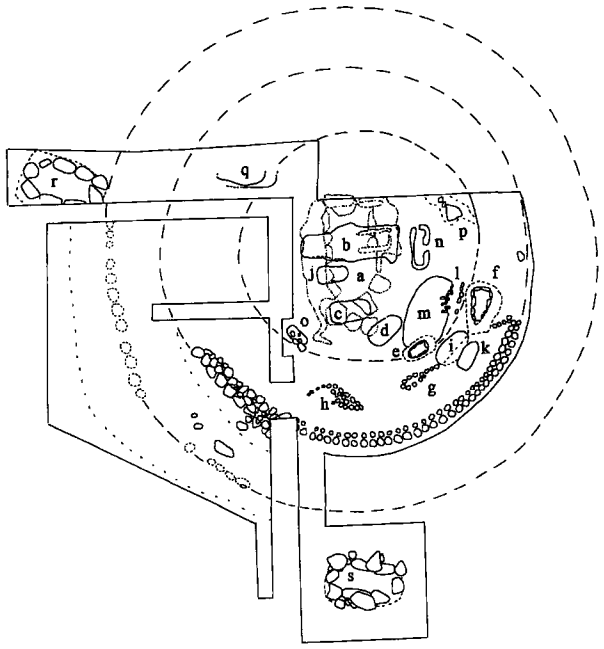


Fig. 18f. Kirkebjerggård. Several short excavations between 1957 and 1971. The second phase of the barrow is diagrammatically reconstructed to the south-east. The three phases of the barrow were demonstrated by the excavators in the southern and south-western parts.

Fig. 18a-f. Drawn by John Simonsen on the basis of drawings by Svend Søndergård/Niels Sterum (a and d), Ole Schmidt (b and e), Jens Vellev (c), and Bent Jensen/Ib Radoor/Jens Vellev (f.). The possible boundaries of the barrows and their phases are tentatively indicated by stippled lines added by the author with diameters of c. 11 m (Hvilsom), 16 m (Glenstrup — the excavator suggested a diameter of about 18 m), 15 m (Langvang) and 7, 11, 14 m (Kirkebjerggård, in three phases).

in that it was both situated as the central grave in a small barrow and had an unusual basal layer of broken flint. The grave contained the skeletal remains of a child of 2–3 with a straight-walled, cardium-decorated beaker as grave goods.

Position in cemeteries

From the more recent excavations in which whole barrow sites are excavated, it is clear that the short stone cists do not normally occur as primary graves. It is also seen that by far the majority of the short cists were constructed at the edge of existing barrows or that a barrow has been enlarged (as at Strandet Hovedgaard) after which burials are made around the edge. It is also found that the cists at the edge in a very high number of cases occur both as "chords" and as "tangents" to the rim of the barrow or the stone footring. To what extent examples of graves or cemeteries under the normal ground surface may be hiding amongst earlier excavations of just a few or isolated short cists is unknown and cannot be determined (cf. Sterum 1976). But many recent, professional excavations uniformly reveal the place of construction to have been in and beside grave mounds. Nevertheless the excavations at, for instance, Møllegård, indicate that short stone cists with no association with a barrow can occur.

The deposition of the peripheral burials took place as a rule without the central graves or grave structures being disturbed in any way. In the case of the graves

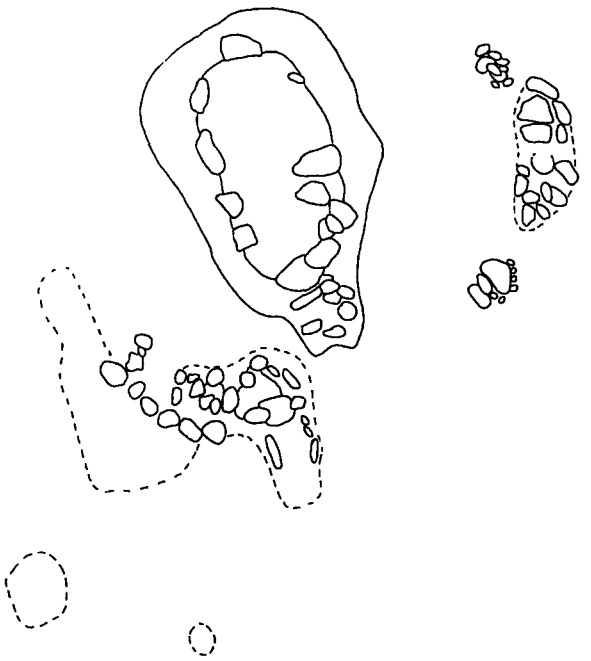


Fig.19. Møllegård, Glyngøre parish. Short stone cist excavated 1999.

outside the bounds of the barrow, I regard these as generally being later. Perhaps a change in the view of the proper place to locate the cist took place, so that just outside the barrow became acceptable when there was no longer space just inside the barrow at the particular site (see below, on the clustering of graves). The barrow, feature V, from Strandet Hovedgaard is not alone in having been enlarged from a small barrow to a larger structure. We now have several documented cases of the enlargement of small burial mounds in the late Single Grave Culture and the construction of graves in and around their edges. The built-up barrows of this kind are most properly to be described as medium–sized burial mounds in Danish terms. The barrows from Toftelund, Glenstrup, Skringstrup, Kirkebjerggård and Strandet Hovedgaard have diameters ranging from 12–13 m right up to 16–17 m.

The idea of constructing the cists at the edge of the barrows involves not only short cists, but also adult-length stone cists and graves of quite different type, such as flat graves. The distribution of this feature is likewise not restricted to the areas with short stone cists but rather occurs as a phenomenon in many other parts of Jutland at the same time.

Already about half-a-century ago (in connexion with the excavation of a barrow at Esbjerg), Harald Andersen drew attention to the fact that what found expression here in the later Single Grave Culture was an entirely new phenomenon in the context of Stone-age barrow graves (Andersen 1952). In Himmerland indeed, which lies within the core area of construction of short stone cists, we already know from an earlier date a find from Vebbestrup (Fig. 20) that shows that even in Himmerland there are barrows with only flat graves in the same positions as the short stone cists (Pedersen 1949). Matching examples are also known from, for instance, Redsted parish on Mors (Siemen 1980). The new concept which thus broke through in the later part of the period of the Single Grave Culture seems frequently, amongst other things, to involve the enlargement of existing barrows and the construction of graves at the edge of the barrow, whether in the form of flat graves or stone cists, and

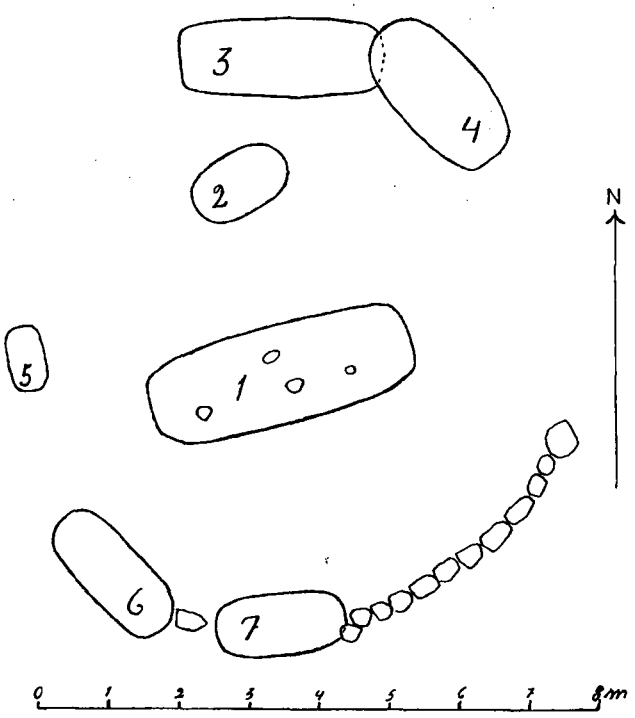


Fig. 20. Vebbestrup. Excavated 1945. The barrow fill was identified and the excavator gives the diameter of the barrow as c. 9.5 m. Seven flat graves were found, several of which were at the edge in the same positions as short stone cists are known in. Drawn by Ragnar Pedersen.

irrespective of whether it were an adult or a child that was to be buried.

This new concept seems really practical and straightforward, as in fact on the one hand it maintained the old burial mounds with earlier burials as the place where the dead were interred at the same as it substantially increased the capacity of these barrows to accept new burials around the edge.

It is quite interesting that although the short stone cists were an important element in northern Jutland, they did not find a place in central or southern Jutland, which are otherwise seen as central and innovative areas in the earlier phases of the Single Grave Culture.

The occurrence of a series of common traits (grave-forms, building-types, pottery) in the area of northern Jutland south of the Limfjord might possibly indicate some form of unity in the population of these lands.

Particulars of the short stone cists

Ever since the first comprehensive study of them, the cists have been assigned to the late Single Grave Culture and the early Dagger Period (Becker 1936, 204). In Ebbe Lomborg's account of the grave-forms of the Danish Late Neolithic, he noted that genuine "Oder cists" are practically impossible to identify in the Late Neolithic (1973, 121). Niels Sterum, on the other hand, drew attention to the fact that there actually were two cists that could be dated to this period on the basis of their contents (1976, 74).

The paucity of cists dated to the Late Neolithic may, however, also be linked to the fact that the basis for dating is not the grave-type itself but rather the grave goods alone. When only the grave goods date the features a large number of graves from which no datable artefacts have come are excluded, unless the graves occur in contexts in which they can be dated by stratigraphy or association with other features.

In 1970, about 125 short stone cists could be counted, most of them with no reliable dating (Sterum 1970). Only about 35 cists, some of which had no preserved capstone, could be dated to the later Single Grave Culture (Sterum 1976). There are now about 30 short stone cists that have been excavated in North Jutland since Sterum's survey. Of these, 26 can be dated to the late Single Grave Culture in my view, and one to the Late Neolithic. Thus the total number of short stone cists is about 155 of which a good 60 can be dated to the Single Grave Culture. It can be assumed that the majority of the whole corpus of short stone cists is to be dated to the later Single Grave Culture.

With regard to the latest cists, no increase in the number has occurred in recent years. A short stone cist from Ålbækparken, Lem parish, excavated by the author in 1982, might be added (Fig. 21), as the form of the pot from the grave appears to belong to the transitional stage between the Single Grave Culture and the Late Neolithic, but its fabric clearly has more in common with Late-neolithic pottery, so that it is best dated to that period. Previously two other short stone cists were excavated a few kilometres to the south-east of this example, in 1942 and 1969, but unfortunately with no datable finds.

When the tradition of constructing short stone cists really came to an end is not clear at present. Two small stone-built cists which unfortunately lacked finds were excavated by Poul Mikkelsen and the author at Resengaard. One of these in particular links itself very closely to those of the Single Grave Culture in respect of form, but both of them were constructed close to buildings that are provisionally dated to the period Late Neolithic – earliest Bronze Age.

C. J. Becker derived the short stone cists from cists of the Corded Ware Culture around the mouth of the Oder (Becker 1936, 205ff.). This view was soon endorsed by other scholars (Glob 1945, 199) and subsequently (Brøndsted 1966, 306f.). However even in the 1950's Becker himself pointed out that derivation from the Oder area was impossible, for chronological reasons in particular (Becker 1954, 76ff.).

It is not the intention of the present article to introduce new perspectives on this problem, which has been discussed by Niels Sterum (1976, 89ff.). The term "Oder cists" should be avoided, as no convincing connexion has been demonstrated (Hansen & Rostholm 1993, 118). A more suitable term is "short stone cists", as is used here, but the term "Skringstrup cists", coined after the find which has been of great importance in the history of the study with the early excavations at this site, would also be acceptable. By this term is understood short, North Jutlandic stone cists of the Single Grave Culture and Dagger Period with a maximum interior length of 1.40 m, constructed of supporting stones and capstones with a flat surface facing into the grave chamber, entirely or partly surrounded by prop stones and sealed around the capstones with packing stones. The majority

Fig. 21. a) Ålbækparken. Excavated 1982. The stone cist had an interior length of c. 0.75 m. The grave is probably an example of a very late stone cist, as shortly before the museum's excavation the landowner had picked up a small, undecorated beaker, the form, fabric and surface treatment of which may belong to the Late Neolithic. b) The small beaker from the grave. Photo: John Simonsen/Mogens Hartmeyer.

of the short stone cists were probably constructed within a period that can hardly have been more than a century.

The individuals buried

From Reersø in eastern Denmark an example has been noted of a small stone cist housing the severely contracted body of an adult (Becker 1936, 199). This grave unfortunately is undated and cannot immediately be regarded as relevant to the short stone cists of North Jutland. A different view of those who may have been buried in the short stone cists was clearly expressed by Erling Albrectsen even alongside the earliest scholarly excavations at Skringstrup: "At the time of the investigation of 1931, the thought occurred to me, that a burial space only 90 cm long and 40–50 cm wide could not possibly be the resting place of an adult individual, even if the deceased were interred there in the common position of the Single Grave Culture: lying on one side with the legs drawn right up" (Albrectsen 1936). In 1933 two barrows were excavated at Merritsholt, Vive parish by the same excavator. In one of these, "Hesthøj", a short stone cist (grave B) was found, 1 m long and 35–50 cm wide on the inside (Albrectsen 1936, 264; Brøndsted 1966, 306). The base of the grave consisted of a 5 cm-thick layer of cockle shells and oysters together with charcoal. In the middle of the floor of the grave were found the remains of a new-born baby or a child from the final stage of pregnancy. There is no doubt that it was the presence of the shells themselves that was a decisive factor in the preservation of the skeletal material. As grave goods, there was a decorated, straight-walled beaker. This lucky find is unfortunately exceptional. But the find gives us a clear indication of the possible original contents of other cists, as it is a short stone cist of quite classical form.

In the many graves from Skringstrup no skeletal or dental remains were found, but Jens Vellev postulated that they could be children's graves (1975, 74).

The short stone cists around the edge of barrows are sometimes found very close to graves in which bones or teeth of children have been identified. At Kirkebjerggård (Malle), for instance, remains of a child's skull were found in one of the seven graves that lay at the edge of the barrow, which could support the view that the short stone cists around the edge may

also have been meant for children (Jensen & Vellev 1971, 7). At least ten of the 16 graves in this barrow were viewed by the excavators as children's graves. In the three cases of tooth enamel being found in this barrow it was from children.

At those sites where short stone cists have been excavated up to now, the soil-type has been of such a character that both unburnt bone and dental remains have decayed without any visible traces left after thousands of years have passed. If, however, the bones were burnt, they would fairly certainly be preserved. Children's bones in particular survive very poorly in the lime-poor, sandy soils of Jutland, and this must be a determinative factor in why more traces of children have not been found in the short stone cists. Although adult skeletons survive somewhat better in the same soil conditions, it is important to note that no traces of adults have been found in the short stone cists in the now really high number of graves from North Jutland, and this is itself conclusive, not least as tooth enamel from adults is practically indestructible even under these soil conditions and would therefore unquestionably be found in the large number of careful excavations. The short stone cists of North Jutland of the late Single Grave Culture and early Dagger Period must therefore generally be regarded as children's graves. It is to be added that the dimensions of the grave goods such as pottery also support this view (further, below).

With regard to the next difficult question, which concerns the age and sex of the deceased children, no survey of the short stone cists of North Jutland will be attempted. In this context, there may be reason, however, to turn back to the excavation at Strandet Hovedgaard. The large number of small graves in the cemetery cannot be directly ascribed to particular age groups amongst the children as no skeletal parts were found in the excavation. Only in two cases were there dental remains (as noted, from a 3–5-year-old and a 6–8-year-old respectively). Most of the graves, however, are surprisingly short (Fig. 23).

We know very little about the general conditions of life for children in this period, and the mean height of children in relation to their age is naturally purely a matter of guesswork. Even though the maximum human stature of that period is now thought generally to have been lower, it does not follow that growth and stature in the earliest years was markedly different from the present.

If, however, we allow ourselves to compare the length of the Strandet graves with the modern average growth charts that are used by the Danish health authority for the routine measurement of children nowadays, the following speculative picture can be produced, assuming an extended position in the grave and use of the full length of the cist: twelve inviduals under or at most 1 year old; four at most 2–3 years old; and four at most 5–10. These figures should of course be taken with every conceivable reservation. It should be added that since the excavators, as noted above, interpret the narrow grave G as a double grave, there may here have been two very small children.

With regard to the question of whether the burials were made extended or in some other position, we do not have a lot to build upon. In one of the short stone cists (F.), however, there may be traces of a burial lying on one side in the form of a diffuse dark feature on the floor of the grave. If the graves did contain burials on the side with slightly flexed legs the individuals buried may have been a bit older than postulated above.

Aspects of the social and cultural circumstances of children in the late Single Grave Culture

With the occurrence of a small flint axe in grave C and of both amber beads and pottery in seven other graves it would be all too easy for present-day archaeologists to imagine that these represent one boy's grave and seven girls' graves. But in the context of this period's farming society, we could not be certain about such sexings. Of the many questions that assert themselves just a few will be listed: Did small girls also use axes as tools or playthings in daily life, so that they could even have had some close association with such implements? Did boys too have pottery or amber beads in their world? Did some causes of death demand special grave goods? Or was the child's position in, for instance, a sequence of brothers and sisters marked by some particular grave goods?

An explanation of the presence of the children's cemetery is not obvious. If the whole grave assemblage from all 21 of the graves is taken into consideration there is immediately a striking lack of battle axes, and the question therefore arises of whether their absence in the graves excavated can be considered significant in this case. Is it conceivable that the barrow was constructed purely as a burial place for individuals of a special group, namely for those who had perhaps not

yet become "recognized" adults and passed through possibly associated rites of passage linked to that? In the case of the boys, is it conceivable that they were given the so-called battle axe — or obtained the right to carry one — only after such rites of passage as a symbol of their social position and gender?

To try to understand the possible implications of age groupings in a society, it is necessary briefly to take a look at anthropological studies which reveal that in many societies worldwide one or more important rites of passage are a common phenomenon, the purpose of which is to dramatize the transition from one social state to another by creating a boundary or margin between them. In some societies there are a number of age sets (Barth 1987, 12) and rituals of different character mark the transition from one group to another. In the rite of passage the individual is within a sequence in which he or she belongs to neither the one state nor the other. In so far as our basic understanding of human society is directed towards a system of social positions we can regard the liminal position as being a situation between two structures. In several societies it is particularly the rite of passage between child and adult that marks one of the most important social boundary lines between individuals, and these rituals are frequently some of the most meaningful in the course of an individual life. It is also often in this context that the individual has confirmed his or her gender in addition to the biological sex.

The Belgian anthropologist Arnold van Gennep defined the category of transitional rituals, which he labelled *rites de passage*, in 1909. He showed that rites of passage have a tripartite structure, consisting of three phases, namely a separation phase, a liminal phase and an integrational phase. The British-American anthropologist Victor Turner has pointed out the doubleness of the rituals, in that they are functionally integrational in the way they hold the community together as a collective social unity, and symbolically significant at the same time. Through the liminal phase of the ritual, which is partially characterized by mystical experiences, the participants achieve a strong feeling of community, which is necessary for the society to continue to be integrated. The sense of community experienced is decisively different from that which is obtained by way of the fixed and stable relationships inhering in the general community. In the liminal phase the participants are placed beyond connexions to previous classes and groups (Turner 1967).

Accounts of rites of passage all around the world show how the participants are frequently subjected to a number of difficult tests by means of a range of symbolic events and mystical experiences — hunger, want, flogging, circumcision or terror of various forms, etc. The process also often leaves immediately visible signs of the rituals having been performed on the individual: scarring left by deep cuts into the skin, missing teeth, tattooings and circumcision etc. It is older age groups in the community who arrange the events, but this is a dangerous moment which involves potential unrest against the community. In the liminal phase the young are placed outside the normal regulation of society. After the liminal phase the individual is re-integrated at a new level in the community, as an adult man or woman.

The time for the holding of rites of passage can in certain cases be drawn out or accelerated in accordance with the community's immediate needs. There are cases where groups have waited until a large group of children were "ready" to pass through the rituals and be initiated into adult society. By contrast "external" factors such as war, crop failure, trading opportunities, epidemics, spirit possession etc can create circumstances in which it is difficult to get the eldest children through the rites of passage, e.g. in the case of boys possibly even some time before sexual maturity, if there is an acute need for weapon-bearing males.

If we turn our view back to the end of the Stone Age, it is generally accepted that the average life-expectancy was much lower than nowadays. We do not, of course, know whether this may have meant that the transition from child to adult generally took place early.

Irrespective of the theoretical possibility that the cemetery excavated at Strandet Hovedgaard was meant for individuals who had not passed through rituals of the type discussed above to mark their transition from child to adult, the finds from this site can in any case be regarded as building bricks in an incipient discussion (cf. Andersson, Welinder & Westeson 1995) of the circumstances affecting the youngest individuals of the neolithic farming society.

Grave goods equivalent to those of adults

As noted above, what appears to be a crucial difference in the grave goods of children's and adult graves in a general view is the absence of battle axes from children's graves. Apart from that there is a remarkable similarity in the grave furnishing.

If, once again, we take the burials at Strandet Hovedgaard as our reference point, it is clear that the form, decoration and motifs of the pottery match closely with those in adults' graves elsewhere in the area. The tempering, the treatment of the surface, the technique of decoration, and the firing, are all exactly as in beakers from local adult graves of this date. The vessels are simply smaller.

The flint axe from grave C is also small, as indeed are the other two unstratified axes from the barrow. The amber beads are all fairly small, as, however, they can be in adult graves. Two longer amber beads are clearly fragments of even larger beads that had been re-used by being reperforated across the original longwise perforation.

It seems quite evident that this assemblage does not represent special products that could relate to the children's world but matches the inventory of adults, albeit at a smaller scale. Burials in these graves accompanied with grave goods such as axes, pottery and amber beads see thus to have been subject to the same set of norms as the burials of adults both in terms of the production of the artefacts and their location in the graves etc. Just as in adult graves, decorated, straight-walled beakers are thus prominent. In the children's graves these vessels form a particularly marked and conspicuous element in grave furnishing in the area of North Jutland, and occur in small flat graves, small lined graves and short stone cists *et al.* The type of grave that was preferred thus seems not to have influenced the choice of grave goods.

We cannot, of course, entirely rule out the possibility that in some cases the pots may have been on the settlements for some time, possibly used for children. They do not, however, generally show signs of wear, and in excavations of settlements sherds of straight-walled beakers have in fact proved rare. It seems still to be the case that these were beakers produced to be used in ritual deposition in graves.

The conclusion has to be that the children's graves are in many ways like the adult graves, just of smaller dimensions. This includes, amongst other things, the stone cists, which have the same method of construction, the same form and the same location. It applies to the grave goods too, which in the case of the pots have the same form and decoration, but, as noted, are consistently of smaller size.

The role of children in the late Single Grave Culture

We do not have a full overview of evidence from Denmark for children's graves of the late Single Grave Culture and the early Dagger Period. Amongst the various types of children's graves the most striking is the short stone cists which have attracted attention and been discussed for a long time. If one looks for information on the role of children in the late Single Grave Culture, one has to assume that it is precisely these burials that best reflect the situation. Settlement finds and hoards seem, by contrast, not to be able to provide any answers to questions about the role of children. The large burial chambers of stone (Ebbesen 1985) and wood (Hansen 1996) that are associated with collective burials are likewise unable to make any contribution at present. It is therefore only the grave finds from especially those graves in which one or two individuals were buried that for the time being can act as the basis for analyses and evaluations. The difficulty of finding neolithic children's graves, or of identifying graves as those of children, have occasionally led to speculation about the extent to which children in general were afforded burials of the ordinary type.

With the finds from cemeteries or barrows of the late Single Grave Culture we have come to know about a relatively large group of children's graves from the Danish Neolithic for the first time. It is also evident that at an increasing number of cemeteries the children's graves constitute a significant proportion in comparison to the number of adult graves (e.g the sites referred to at Skringstrup, Langvang, Glenstrup and Kirkebjerggård), or are the only category present, as appears to be the case at Strandet Hovedgaard. Children's graves also occur as central graves in the late Single Grave Culture. This is now well documented by several finds. As noted above, those buried in the central grave at Kirkebjerggård were a child of about 10 and a baby respectively. At Strandet Hovedgaard it was a 3–5-year-old buried with a small axe. This phenomenon is also known from the Single Grave Culture outside of North Jutland, for instance from the abovementioned grave from Esbjerg in South Jutland, where a child of about 18 months was buried in the central grave, which is interpreted as a boy's grave (H. Andersen 1952).

The phenomenon of the foundation of cemeteries (burial mounds) with primary children's graves is also

known from later periods in North Jutland, e.g. from Egshvile with early urn graves (Olsen 1992) of the Early Bronze Age. A second example excavated within recent years is Hjordkær in Southern Jutland, where a child's grave of the middle of the Early Bronze Age was constructed as the central grave in a secondary barrow phase (Jørgensen 1984).

That children's graves of the Single Grave Culture occur at the edges of barrows along with both children's and adults' graves and as central graves over which barrows with either adult graves or children's graves were raised, could possibly be interpreted in terms of children having played a significant role, perhaps in certain cases on a par with adults. This tendency towards equality seems also to hold between the sexes. The grave goods appear on the whole to be balanced between women and men, and other aspects of the construction of the graves and their location in the cemeteries do not immediately show any preferential treatment of either sex. With the large number of graves that have become available since the comprehensive survey of the evidence (Glob 1945), this is, however, an area that needs a new study. The strong marking of social roles seems to have been an especially characteristic feature of the period. Both male and female grave goods can be seen as expressing symbolic values. In this way, many of the so-called battle axes with very narrow shaftholes can hardly have been of great use in actual battle and were probably more meaningful signs in a social context.

There is nothing to suggest that in the period of the Single Grave Culture in Jutland there was some definite class of both adults and pre-adults of lower status than the rest of the population. The appearance of a more "aristocratic" segment of society that maintained the culture, such as has been proposed in respect of the Swedish-Norwegian Battle Axe Culture (Malmer 1975, 120) seems quite simply to lack support in the finds from Jutland.

There could, however, of course have been certain differences in society. Whether, for instance, the presence of battle axes, several axes, or symbolic axes in particular men's graves may have signalled higher status than weaponless graves can probably only be revealed by new analyses of the grave finds.

In the children's graves that have been found there may be differences in the presence or absence of grave goods. But some of the grave goods may very probably have been of organic material and therefore not been preserved. Even in respect of the interpretation of the children's graves with surviving grave goods of primarily inorganic materials, care has to be urged. It is not certain that the position of the living children in the late Single Grave Culture is directly reflected by the dead children's graves in some immediately proportional way. With the occurrence of this eventually large group of children's graves, however, one of the possible interpretations could be something like changes gradually taking place in the relationship between the individual and the group. These may have been changes in inheritance rights as a result of which the position of the children may have been something different even from a very early age.

It has recently been argued that in the Early Bronze Age a hierarchical power system was established, based primarily on the individual, and that this evolved from a power structure of the Late Neolithic in which it was primarily groups of people who possessed the majority of the power (Vandkilde 1996). The dynamic of this process is suggested to have included conflicts, with consequences for the relationship between the individuals of society and its groups of people.

In the present author's view, it can be taken for granted that at the start of the Single Grave Culture and in its later course there were extensive social changes, and possibly even decisive breaks with previous norms and habits. It is not inconceivable that precisely those social structures which may appear in the Early Bronze Age were actually the result of trends that had their roots back in the Single Grave Culture. This development may, however, very well have proceeded in waves, which also had their regressions. In any case, it is important to be aware that the changes between the Single Grave Culture and the Early Bronze Age do not have to follow a linear course of development.

Social structure in the late Single Grave Culture

In cemeteries pertaining to the Jutlandic Single Grave Culture, graves are often encountered which were constructed very closely together, e.g. on top of or immediately adjacent to other graves. Such observations were noted as soon as the period was discovered in the 19th century, and immediately gave rise to theories of these closely spaced graves containing closely linked, i.e. a family's, graves (Müller 1898, 163). At the above-mentioned barrow from Esbjerg three graves were found, with the

child's grave (Fig. 22) in the middle and a woman's grave and a man's grave parallel to it on either side. The excavator wrote that it was likely, although unprovable, that these were the parents of the boy, and that together with the other graves in the barrow this was very probably an example of a family burial place (Andersen 1952, 160f.).

In many barrows of the Single Grave Culture in Jutland, however, only graves which are regarded as adults' graves have been found. With the occurrence of the small graves at the cemetery at Strandet Hovedgaard, and their location in and around the barrow, these circumstances may immediately lead to comments in respect of some of the cemeteries, and can possibly contribute new aspects to hypotheses concerning social relations in this period.

It should first of all be noted, for the sake of order, that the cemetery cannot reflect something like a brief, deadly epidemic which could conceivably have forced hasty burials at the same site. Amongst other things there are too many phases in the structure and too many types of grave. It is, however, particularly interesting, and thought-provoking in respect of social structures, that the site —for what was evidently more than a very short period — was maintained as the cemetery for burials, all of which were of child length. This continued despite the gradual introduction of new strategies of location in the barrow or in its immediate surroundings, and irrespective of the introduction of new grave-types.

Secondly, the quantity of children's graves in this find and the absence of adult graves show that we ought perhaps to think in completely new directions when the social structure of these areas in the period of the late Single Grave Culture is being described. There are several features that indicate that the development in the pottery represented in 17 (possibly 18) graves around the edge of barrow phases 1 and 2 cannot as a whole have covered any more than an advanced part of the late Single Grave Culture. This could mean 50 to 75 years, or, in other terms, 2–3 generations.

In a really large number of the grave finds of this period it has been observed that people usually knew very precisely where the earlier graves had been placed in the barrow. During the construction of new graves, the older burials were respected. One must therefore assume that probably they knew where would be a good place for new graves.

All the same, the graves at Strandet Hovedgaard

Fig. 22. Esbjerg. Child's grave of the late Single Grave Culture. Photo: Harald Andersen.

show a distinctively uneven distribution. To the south-west there appears a marked clustering of graves (G, H, J, K, Q and possibly V). To the north-west there is another cluster of graves (O, E, F and T). To the east there is yet another cluster (L, M, R, N, D and S). Close to the latter cluster there are just two graves (I and U) and otherwise there is a free, unexploited area in the ground around the edge of the barrow.

It is tempting, as a result, to propose as a working hypothesis, that these three clusters principally represent deceased children from three contemporary households over, probably, two to three generations. One could then suppose that per household there were on average three child deaths per generation in the course of two generations, or two deaths per generation across three generations. One can then postulate that adult individuals were probably buried in or beside nearby barrows.

This hypothesis of a possible common burial place for the children of a district over a short period is decisively contrary to the common perception of barrows as burial places for individual families. There is unfortunately no space here to go further into this hypothesis or its presuppositions and consequences. We shall simply here point to special circumstances concerning the position of graves in several North Jutlandic barrow sites that were briefly surveyed in a previous section.

It appears, indeed, that the distinct clustering of graves interspersed with free, unused space, is not at

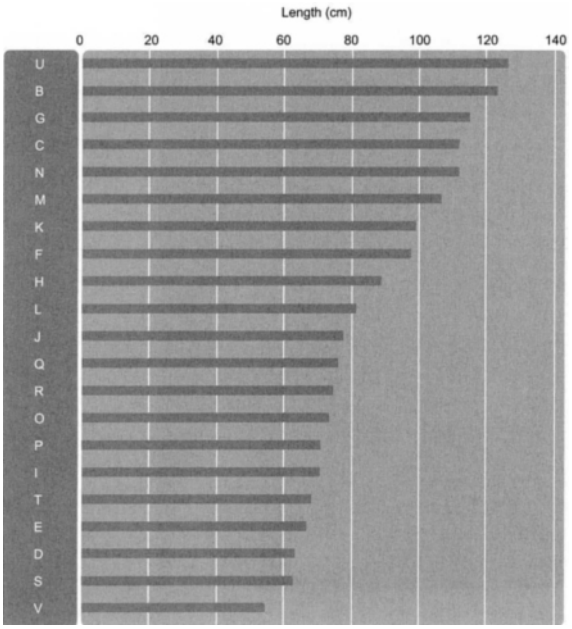


Fig. 23. Strandet Hovedgaard. As the histogram shows, the interior lengths of the graves are consistently significantly below an adult height, and many of them are quite exceptionally short. In graves with end stones the measurement is taken along the central axis between these stones (in grave E, F, V, however, to stone marks at one end). In grave S the measurement was taken to the edge of the pit. For the other graves the length of the flat floor of the grave is given.

all unique to Strandet Hovedgaard. On the contrary, it seems to occur in quite a large number of cases, including those with stone cists. At precisely the same time there also appears to have been a clear knowledge of where the earlier graves lay, as there was often digging very close beside these, but emphatically done so carefully that they were not damaged: a) end to end, and at consistent intervals (e.g. Toftelund, Hvilsom, but occurs also at many other sites); b) end to end, partly built together (e.g. Langvang); c) parallel, side by side (e.g. Langvang, Glenstrup, also Mejlby [Sterum 1976, Fig. 11]); d) parallel but built together, possibly with a common long side (e.g. Glenstrup; also Dalgaard in Fårup [Nørgaard 1968, 152]); e) parallel, but partly at a different level from one another (e.g. Strandet Hovedgaard); f.) immediately on top of one another (e.g. Engedal); g) close together but at an angle to one another (e.g. Langvang); h) at an angle to one another and partly built together (e.g. Lynnerup).

There is thus a great deal of evidence for the clustering of graves which cannot be explained by lack of space in the barrows in question but must be due to other factors, such as the hypothesis suggested above.

The graves from feature V at Strandet Hovedgaard derive from the late Single Grave Culture in Jutland. They also form an integral part of the North Jutlandic milieu of the late Single Grave Culture. Unique at this site is the occurrence of 21 graves all of lengths that fit children. This number of times must the ceremonies and rituals of burial have been played out in a way that we can scarcely ever have experienced.

The ideas that have been proposed here after the survey of the known grave finds of the Single Grave Culture (and the early Late Neolithic) in North Jutland are first and foremost to be seen as working hypotheses and as a contribution to a discussion of society and culture in this period. I have in any case attempted to point out certain key questions concerning the social and cultural circumstances of this period which also affect our general understanding of the settlement structures of the age.

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References

Albrectsen, Erling 1936: Nogle Stenkistegrave fra den yngre Stenalder. *Aarbøger for nordisk Oldkyndighed og Historie* 1936. København.

- 1941: Nogle yngre Stenalders Grave i Rinds Herred. *Fra Viborg Amt* 1941. Viborg

Andersen, Harald 1952: Fra tomten af en sløjfet høj. Fem stadier af en gravhøjs historie. *Kuml* 1952. Aarhus.

Andersen, Søren H. 1983: Kalvø - a coastal Site of the Single Grave Culture. *Journal of Danish Archaeology* 2, 1983. Odense.

Andersson, Gunlög, Welinder, Stig & Westeson, Åsa 1995: Barndomens gränser under mellanneolitikum. In Johnsen, Barbro & Welinder, Stig (eds.): *Arkeologi om Barn.* Occasional Papers in Archaeology 10. Stockholm.

Barth, Frederik 1987: *Cosmologies in the making.* Cambridge

Becker, C. J. 1954: Die Mittel-Neolithischen Kulturen in Südskandinavien. *Acta Archaeologica* XXV. København.

- 1936: Enkeltgravkulturen på de danske Øer. *Aarbøger for nordisk Oldkyndighed og Historie* 1936. København.

Brøndsted, Johannes 1966: *Danmarks Oldtid. Stenalderen.* København.

Ebbesen, Klaus 1985: Nordjyske gravkister med indgang. Bøstrup-kisterne. *Aarbøger for nordisk Oldkyndighed og Historie* 1983. København.

Glob, Peter Vilhelm 1945: Studier over den jydske Enkeltgravskultur. *Aarbøger for nordisk Oldkyndighed og Historie* 1944. København.

Hansen, Mogens 1996: Træbyggede gravkister fra Enkeltgravskulturen og Senneolitikum. *Kuml* 1993-94. Aarhus.

Hansen, Mogens & Rostholm, Hans 1993: Single graves and Late Neolithic graves. In Hvass, Steen & Storgaard, Birger (eds.): *Digging into the Past - 25 Years of Archaeology in Denmark.* København.

Hvass, Lone 1986: Keramikken i den jyske enkeltgravskultur. In Adamsen, Christian and Ebbesen, Klaus (eds.): *Stridsøksetid i Sydskandinavien.* Arkæologiske Skrifter 1. København.

Hvass, Steen 1978: A House of the Single Grave Culture Excavated at Vorbasse in Central Jutland. *Acta Archaeologica* 48, 1977. København.

Jensen, Bent & Vellev, Jens 1971: Erobrerfolkets børn. *Skalk* 1971/1. Højbjerg.

Jørgensen, Erik 1984: To gravhøje ved Hjordkær i Sønderjylland. Om særprægede senneolitiske gravanlæg. *Kuml* 1984. Aarhus.

Lomborg, Ebbe 1973: *Die Flintdolche Dänemarks. Studien über Chronologie und Kulturbeziehungen des südskandinavischen Spätneolithikums.* Nordiske Fortidsminder Serie B 1. København.

Malmer, Mats P. 1975. *Stridsyxekulturen i Sverige og Norge.*

Müller, Sophus 1898: De jydske Enkeltgrave fra Stenalderen, efter nyeste Undersøgelser. *Aarbøger for nordisk Oldkyndighed og Historie* 1898. København.

Nørgaard, Peder Christian Overgaard 1968: Morslands Historiske Museum. *Historisk årbog for Thisted amt.*

Olsen, Anne-Louise Haack 1992: Egshvile - A Bronze Age Barrow with Early Urn Graves from Thy. *Journal of Danish Archaeology* 9. 1990. Odense.

Pedersen, Ragnar 1949: Slotshøjene. En gravplads fra yngre Stenalder i Sydhimmerland. *Fra Himmerland og Kjær Herred,* XVI.

Siemen, Palle, 1980: Enkeltgravshøje i Redsted sogn på Mors. *MIV Museerne i Viborg amt* 10.

Simonsen, John 1983: A Late Neolithic House Site at Tastum, Northwestern Jutland. *Journal of Danish Archaeology* 2. Odense.

- 1986: Nogle nordvestjyske bopladsfund fra enkeltgravskulturen. In Adamsen, Christian & Ebbesen, Klaus (eds.): *Stridsøksetid i Sydskandinavien.* Arkæologiske Skrifter 1. København.

- 1987: Settlements from the Single Grave culture in NW-Jutland. *Journal of Danish Archaeology* 5, 1986. Odense.

Sterum, Niels 1976: Hellekister i sen jysk enkeltgravskultur. Fra periferien af jyske enkeltgravshøje. *Aarbøger for nordisk Oldkyndighed og Historie* 1974. København.

- 1970: *"Oderkister". En materialesamling med kommentarer.* Unpublished paper, Århus Universitet.

Turner, Victor 1967: *The Forest of Symbols. Aspects of Ndembu Ritual.* New York.

Vandkilde, Helle 1996: *From Stone to Bronze. The Metalwork of the Late Neolithic and Earliest Bronze Age in Denmark.* Jutland Archaeological Society Publications XXXII. Aarhus.

Van Gennep, Arnold 1960(1909): *The Rites of Passage.* Chicago.

Vellev, Jens 1971: Oderkistepladsen i Skringstrup. *MIV Museerne i Viborg amt* 1. Viborg.

- 1972: Nye udgravninger på „oderkiste"-gravpladsen i Skringstrup. *MIV Museerne i Viborg amt* 2. Viborg.

- 1975: Skringstrup-pladsen. Nye betragtninger. *Hikuin* 2. Aarhus.

Grave B

Undisturbed grave with charred wooden cover, base 0.11 m under ground surface. Above the grave and partly sunken into it was found greyish soil like the fill of the barrow. The pit appeared as an oval feature 1.62 m long. Within the feature were traces of a rectangular grave with an interior length of 1.28 m at the base. This grave had been covered with a wooden cover with a charred surface, which in size was a bit larger than the grave chamber itself. The direction of the grain of the charcoal was seen in several places to be parallel with the long axis of the grave and the charcoal from the cover was found sunk into the grave. In the eastern half of the grave, to the south, tooth enamel was found. No grave goods or skeletal remains were otherwise discovered.

Grave B (from N).

Grave C

Undisturbed grave with charred wooden cover, base 0.09 m under ground surface. The pit appeared as an oval feature 1.41 m long. Within the feature were traces of a rectangular grave with an interior length of 1.12 m. This grave had been covered with a wooden cover with a charred surface, which in size, as in grave B, was a bit larger than the grave itself. The direction of the grain of the charcoal was seen in several places to be parallel with the long axis of the grave, and the charcoal from the cover was found sunk into the grave. In the western half of the grave to the south was found a small flint axe with a "hanging" edge. Immediately beside the edge of the axe tooth enamel was found, but there were no other skeletal remains.

Grave D (from N).

Grave D

Undisturbed stone cist, base c. 0.62 m under the ground surface, but since the cist was very short, compact and relatively high, the top of the capstone was found only just below ground surface. Above the grave was found soil like the fill of the barrow. The pit appeared

Grave D (from W).

as a feature 1.30 m long. The interior length of the stone cist was c. 0.64 m, and the long sides consisted of both one larger and one smaller stone, placed symmetrically. The capstone construction was formed principally of one large and two smaller stones. In the northern part of the grave to the east lay a small beaker and in the southern half to the west fragments of oyster shells. It cannot be excluded though that these were brought into the grave by animal activity. No skeletal or dental remains were found.

Grave E (from W).

Grave E

Stone cist, incompletely preserved. The cist was constructed at a considerable depth below ground surface and it is considered that its capstone must have been at a level in relation to the ground surface corresponding to the mean of the stone cists with preserved capstones. Above the grave was found soil like the fill of the barrow which had been turned over by subsoiling. Parts of the cist had been pushed somewhat to the west. The pit appeared as a feature 1.40 m long. The interior length of the stone cist was 0.61 m measured from a slight stone mark to the north-east. The long sides of the cist both consisted of two large stones placed symmetrically. The capstones had undoubtedly been removed by the ploughing, and in the western part of the grave stood a small beaker that had clearly been partly crushed in the same way. No skeletal or dental remains were found.

Grave F (from NW).

Grave F

Stone cist, incompletely preserved. The supporting stones of the cist were slightly pushed out of place by subsoiling. The cist was constructed at a considerable depth below ground surface and it is considered that its capstone must have been at a level in relation to the ground surface corresponding to the mean of the stone cists with preserved capstones. Above the grave was found soil like the fill of the barrow which had been turned over by subsoiling. The pit appeared as a feature 1.83 m long. The interior length of the stone cist was 0.99 m measured from a stone mark to the north-east. The long sides of the cist consisted on the eastern side of two large and one small stones. The

Grave G (from c. W).

other side consisted of four stones of approximately equal size. The capstones had been ploughed away. In the southern part of the grave to the east stood a small, well-preserved beaker, and a short distance away from it lay an amber bead. On the sandy base of the grave was observed a greyish feature, possibly a body stain. No other skeletal or dental remains were found.

Grave G

Undisturbed stone cist, base 0.55 m beneath the ground surface. The cist was very long and narrow, but had more than one layer in its complex capstone construction, producing a significant external height with the top of the capstones lying just under the ground surface. Above the grave was found soil like the fill of the barrow. The pit appeared as a feature 1.85 m long. The interior length of the stone cist was 1.13 m. The long sides consisted of four stones to the west and five to the east. The capstones consisted to the south of a single large stone. Further north was what was practically a double layer of capstones. In the northern half of the grave stood a small beaker and in the southern half lay a small beaker. The grave is regarded as a double grave. Beneath the northern beaker was found about 5 mm of soil, which could be interpreted in terms of some organic material originally having lain beneath the vessel. No skeletal or dental remains were found.

Grave H

Undisturbed stone cist, base 0.56 m beneath the ground surface, but since the cist was very short and relatively high the top of the capstone was found just beneath the ground surface. Above the grave was found soil like the fill of the barrow. The pit appeared as a feature 1.52 m long. The interior length of the stone cist was 0.89 m. The eastern long side of the cist consisted of two large stones and its western long side two large and one small stones. The capstone construction consisted primarily of one large and two small stones. Approximately in the centre, but in the southern half of the grave, lay four amber beads. No skeletal or dental remains were found.

Grave G (from c. W).

Grave H (from c. E).

Grave H (from c. W).

Grave I

Undisturbed grave with large end stone and supporting stones, base 0.64 m beneath ground surface. The pit appeared as an oval feature consisting of greyish-brown sandy soil 1.16 m long. Within the pit were traces of a rectangular grave with an interior length of 0.58 m. The sides of this grave could be seen as strips of rotted material 20–30 mm wide but nothing of the kind could be seen at the ends. The sides must have consisted of wooden planks that were externally propped up by stones. It is possible that only the large stones at each end of the grave formed the ends. No signs of a coffin cover were found, nor were any grave goods, or skeletal or dental remains.

Grave I (from E).

Grave J

Undisturbed stone cist, base 0.62 m beneath the ground surface (measured to the lower edge of the stone flags). The pit appeared as an oval feature 1.27 m long. The interior length of the stone cist was 0.73 m. The floor consisted of two split stone planks around 30–50 mm thick. The long sides of the cist both consisted of one large and one small stone, symmetrically placed. The capstone construction consisted primarily of one large and one small stone flake. In the southern part of the grave was found a small beaker, standing upright about 5 mm above the stone flag, which may indicate that there was originally some organic material beneath the vessel. No skeletal or dental remains were found.

Grave J and K (from NE).

Grave K

Undisturbed stone cist, base 0.43 m beneath the ground surface with the top of the cist found a little below the ground surface. Above the grave was found soil like the fill of the barrow. The pit appeared as a feature 1.56 m long. The interior length of the stone cist was 0.97 m. The long sides both consisted of four stones, symmetrically placed. The capstone construction consisted primarily of four large stones with some smaller ones wedged between them. In the southern part of the grave stood a pot. Approximately in the centre, in the northern half of the grave to

Grave J (from SW).

the west, lay five amber beads. No skeletal or dental remains were found.

Grave L

Undisturbed stone cist, base 0.38 m beneath the ground surface with the top of the capstone found just beneath the ground surface. Above the grave was found soil like the fill of the barrow. The pit appeared as a feature 1.77 m long. The interior length of the stone cist was 0.80 m. The long sides both consisted of one large and two small stones, symmetrically placed, with an additional small stone wedged into the eastern side. The capstone construction consisted primarily of three large stones. There was also a small, almost acutely angled triangular stone between two of the capstones. In the southern part of the grave stood a pot. No grave goods, skeletal or dental remains were found.

Grave M

Undisturbed flat grave, base 0.22 m beneath ground surface. The pit appeared as an oval feature consisting of greyish-brown sandy soil 1.33 m long. No barrow fill that had sunk into it was observed. The inner, plane section of the base of the grave was 1.05 m long. No signs of a coffin were seen. In the southern end was found a small beaker and an amber bead. No skeletal or dental remains were found.

Grave N

Undisturbed flat grave base 0.38 m beneath ground surface. The pit appeared as an oval feature consisting of greyish-brown sandy soil 1.30 m long. No barrow fill that had sunk into it was observed. The inner, plane section of the base of the grave was 1.02 m long. No signs of a coffin were found at the bottom, but an oblong stone with one surface facing into the grave could have supported a wooden coffin. No grave goods, skeletal or dental remains were found.

Grave K (from SW).

Grave K (from NE).

Grave L (from NE).

Grave O

Undisturbed stone cist, base 0.45 m beneath the ground surface. Above the grave was found no soil like the fill of the barrow but rather soil with clear precipitation deposits, turned by the subsoiling. The pit appeared as a feature 1.13 m long. The interior length of the stone cist was 0.74 m. The long sides both consisted of three slightly larger and one small stones. The capstone construction consisted primarily of two large and one small stones. There was also a small, flat stone on top of one of the capstones. In the eastern end of the grave two pots lay on their sides on the base of the grave, one to the north and the other to the south. Approximately in the middle of the southern side was found an amber bead. No skeletal or dental remains were found.

Grave P

Undisturbed flat grave, base 0.09 m beneath ground surface. The pit appeared as a regular, long oval feature, 0.78 m long, with a light brownish fill. There were no signs of a coffin or grave goods. No skeletal or dental remains were found.

Grave Q

Undisturbed stone cists, constructed (secondarily) directly beneath the surviving kerbstone ring. Very deep beneath the ground surface, and the top of the capstone must have been approximately at (or slightly below) ground level. No barrow fill found above the grave. The pit appeared as a feature 1.35 m long and the surrounding soil was marked by precipitation from the barrow. The interior length of the stone cist was 0.72 m. The long sides consisted of four supporting stones in the southern side and three in the northern. The capstones consisted originally of two large stones. These, however, had collapsed into the grave. No filler stones were found at the upper edge of the supporting stones. In the eastern end of the grave stood a pot about 10 mm above the floor of the grave, which may indicate that there was originally some organic material beneath it. No skeletal or dental remains were found.

Grave M (from SW).

Grave N (from W).

Grave O (from W).

Grave R

Undisturbed stone cist, base 0.44 m beneath the ground surface with the top of the capstone found just beneath the ground surface. The pit appeared as a feature 1.30 m long in relation to the surrounding soil, which was marked by precipitation from the barrow. The interior length of the stone cist was 0.75 m. The long sides both consisted of three stones. On top of the two upright supporting stones to the south of the western side lay two large flat stones, so that the supporting stones here formed two "layers". The capstone construction consisted primarily of three large stones. There was also one large stone on top of the middle capstone. In the southern end of the grave a pot lay on its side, and further north was an amber bead. No skeletal or dental remains were found.

Grave S

Undisturbed flat grave, base 0.58 m beneath ground surface. The pit appeared as an almost circular feature c. 1.46 m in diameter. The fill consisted of a virtually stone-free but very sandy soil. To judge by the traces of sinkage with lighter soil in the upper part of the pit, the coffin was of a short, rectangular form, approximately E–W. At what is assumed to have been base of the grave its length must have been 0.70 m. At the western end was found charcoal in an approximately vertical position. No grave goods, skeletal or dental remains were found.

Grave T

Undisturbed grave with partly charred sides, flanked by a supporting stone lining. Base 0.43 m beneath ground surface. The pit appeared as an almost circular feature consisting of yellow-brown sandy soil, c. 1.15 m in diameter. Inside the pit was found a rectangular grave with an interior length of 0.50 m. The sides were distinguished by 20–30 mm wide marks left by decayed material and the partly surviving charred outer sides of a wooden coffin that was propped up by stones practically all around on the outside. The wooden planks lay horizontally (direction of the grain) on the eastern side and vertically on the short northern side.

Grave Q (from SW).

Grave Q (from SW).

Grave R (from E).

No signs of a coffin cover were seen. In the northern half stood a pot about 5 mm above the base of the grave (which may indicate that there was originally some organic material beneath it), and two amber beads were found further south. On the floor of the grave were seen patches of darker soil, possibly body stains. No skeletal or dental remains were found.

Grave U

Possible flat grave, undisturbed, base 0.53 m beneath ground surface. The pit appears as an oval feature of yellow-brown soil 1.34 m long. No traces of sunken fill from the barrow were observed, and the grave appeared as an almost bath-shaped pit with a light brown fill. There were, however, a large number of small stones in the fill, unlike in any other grave from the cemetery. No grave goods, skeletal or dental remains were found.

Grave V

Stone cist, incompletely preserved. The base of the grave was placed very deep beneath the ground surface and it was inferred that the level of the capstone relative to the ground surface must have been approximately at the average position of the surviving stone cists' capstones. The pit appeared as a feature 1.40 m long. The interior length of the stone cist was 0.55 m along the axis measured from the stone mark to the south. Each long side comprised just one large stone. By the northern end of the cist stood a finely curved quernstone. The capstones were missing. In the southern part of the grave to the east stood a small beaker, partly crushed, probably by the machine digging. Right beside it were found two amber beads. In the northern end of the grave to the east stood a straight-walled beaker. No skeletal or dental remains were found.

Grave T (early, from W).

Grave T (late, from W).

Grave V (from W).

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The Dystrup swords: A hoard with eight short swords from the Early Bronze Age

by Lisbeth Wincentz Rasmussen and Niels Axel Boas

ABSTRACT

The finding of a sword in a potato harvester in the autumn of 1993 led to the excavation of a monotype hoard comprising a total of eight short bronze swords at Dystrup in Northeastern Djursland (Fig. 1)[1]. The swords had been deposited by a large stone on dry land. They are bronze-hilted swords, cast in one piece, and have the form of Hajdusámson-Apa swords. The ornamentation is composed of elements from various swords from period I and from the Fårdrup bronzes. It could be shown that the swords come from the same workshop, which must be domestic. As a hoard find the Dystrup swords are normal for the style, period and zone I. The number of swords is, however, unique and the find is therefore extraordinary, which appears to be the norm for the period!

INTRODUCTION

It is rarely the case today that a single archaeological find results in significant changes in the statistics regarding an individual artefact type. This happened, however, with the finds of the Dystrup swords. Firstly, no monotype hoard comprising so many weapons from the Early Bronze Age had been found previously. Secondly, there were, prior to the find, only a few swords of the Dystrup type known. The way in which the swords were discovered was unusually spectacular. The farmer's children caught sight of the hilt end of the sword among the potatoes on the belt of the potato harvester. It was unusually well-preserved and withstood therefore being washed and presented at school before it came to the attention of Djursland Museum. The children had clearly memorised the

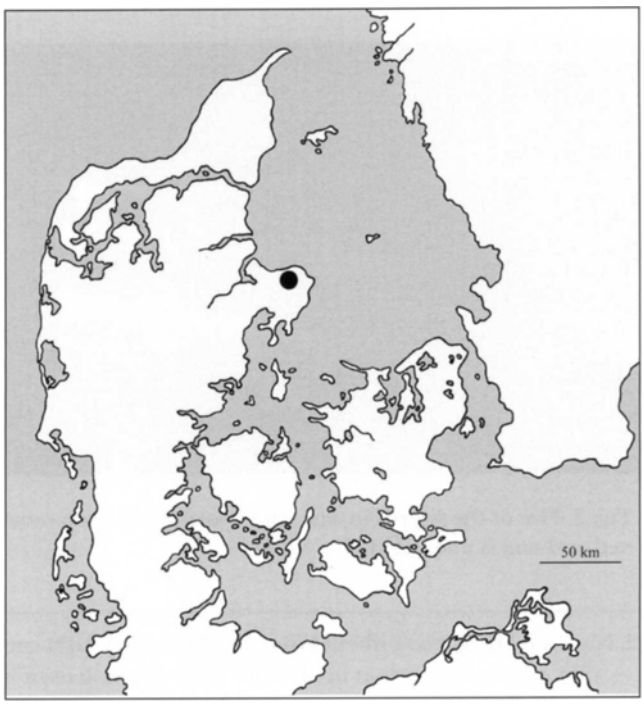


Fig. 1. The location of the Dystrup hoard

1. Djursland Museum DJM 2511, Dystrup, Ørum parish, Djurs Nørre district. The search with metal detectors was carried out by museum curator Niels Axel Boas and, from the regional council, by Ove Madsen. The Hougård family from Dystrupgård is thanked for the co-operation and interest.

whereabouts and in which row of potatoes the piece of sword came up on the belt. They pointed out the spot and using a metal detector the rest of the sword and the hoard were located.

Find site and topography

The find site for the swords lies 0.5 km west of the town of Dystrup, approximately halfway towards Dystrup Lake. The terrain is elevated and approximately flat, but about 100 m to the north it starts a gentle rise. To the northwest there is a rather more undulating and partly forested area with several large Bronze Age burial mounds, which crown the high slopes running down towards Dystrup Lake to the west. 4-5 burial mounds have been registered within 2-300 m of the find site. With the lake, the slopes and the row of burial mounds, the find site today must be said to be distinctive. However, at the time when the swords were deposited the burial mounds had perhaps not been built.

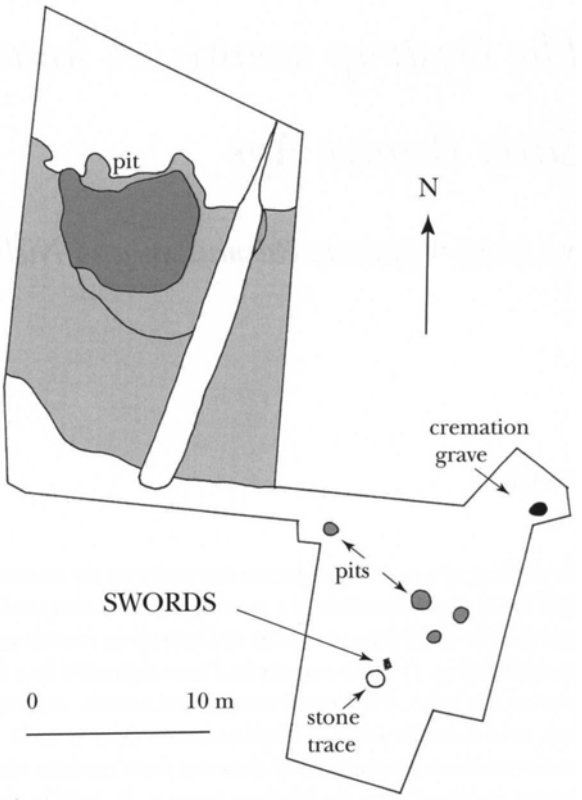


Fig. 3. The excavated area around the hoard.

Fig. 2. Five of the swords in situ. Two swords have been removed and one is unexcavated.

Find situation

With the aid of a metal detector another fragment of the blade of the sword and a piece from another blade were found uppermost in the plough soil within a few metres of each other. A further sword was located deeper in the plough soil. By clearing away the area around this it could be seen that further swords lay beneath this at the base of the plough soil. An excavation field of a few square metres was laid out and a further six swords were exposed [2]. The swords lay close to each other in two layers with the hilts lying as if they had been bound together (Fig. 2). The hilts lay to the north, the sword tips to the south. A small piece of wood, not necessarily prehistoric, lay over the tip of one of the swords. No other organic material was preserved to indicate, for example, the presence of wrappings. There were no visible stratigraphic changes in the soil around the hoard, which extended a maxi-

2. Niels Axel Boas and Lisbeth Wincentz Rasmussen DJM carried out the excavation in October 1993. Frank Jensen is thanked for voluntary efforts involved in the taking up of the cast of the sword impressions. Stud.mag. Peter Lundby participated in the following year's excavation.

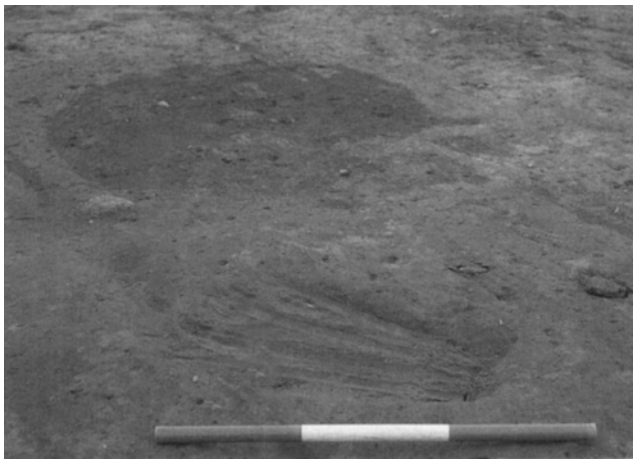


Fig. 4. The marks from the excavated swords is seen in the front of the trace of a big stone.

mum of only 5 cm down into the subsoil.

Immediately an area of approximately 180 m^2 around the hoard was investigated (Fig. 3). Rather more than 0.3 m southwest of the hoard the imprint of a large (1 m) stone could be seen (Fig. 4). Remains of the eroded surface of the stone could be seen at the base and on the sides of the feature. The landowner said that he had recently removed a large and unusually flat stone from this very place in the field. Other features within the excavated area included four cooking pits (Fig. 3) and the remains of a cremation grave (Fig. 3). In addition, there were a few potsherds from the Early Bronze Age period II-III and a little flint in the remains of a culture layer towards the north of the area.

After the harvest the following year, an area of 160 m^2, 60 m to the east, and an area of c. 400 m^2, a little to the northwest of the hoard, were investigated in order to see if further features could be linked to the find. The area to the east lay on the flat part of the low hill on which the swords had been buried. A few cooking stones were seen on the surface. Potsherds from cooking pit A4 could be dated to the Late Bronze Age.

In the area to the northwest of the hoard a compact concentration of cooking stones measuring 7 x 7 m was found. This was bordered to the south, west and east by a prehistoric culture layer. Pottery from the features and the culture layer can, for the most, be dated to the Middle or Late Bronze Age. A small fragment of a mould used in metal casting was also found. Coarse flint sickles from the surface of the field can also have their origin in this settlement environment. Only a very few potsherds can be dated to the Early Bronze Age. The concentration of cooking stones was not excavated further. Similarly, the culture layer was not excavated in full. The investigations showed that there had been settlement at the site through the greater part of the Bronze Age.

At all the larger, well-investigated settlements in the vicinity of Dystrup it is normal that the occupation extends over several periods of the Early Bronze Age. Indeed, in some cases it can be continuous from the Late Neolithic to the Late Bronze Age (Boas 1997). The lack of pressure-flaked flint around the find site suggests that there was no long-term or comprehensive settlement nearby in the Early Bronze Age. The settlement traces in the form of features, concentrations of cooking stones and cooking pits around the hoard are, however, so frequent that a more comprehensive settlement, in both time and space, could easily have been present. It cannot therefore be finally decided whether there was a settlement in the area, in the vicinity of which the hoard was deposited. It is striking that the hoard lay just below the surface without having been damaged during a long period of settlement activity. This is almost only possible if the site was naturally sealed or marked. In addition to the large stone which is known to have been present, there can for example have been large trees which hindered direct access.

The swords

Description (Cf. also table 1 p. 96)

X1[3] (B17617). Bronze-hilted sword broken into two pieces. The outermost 12-13 cm of the blade is missing. The piece has been slightly bent along its length by contact with agricultural implements. Broken approximately in the middle and at the end of the blade. At the outermost break a green patina is visible as on the surface. The edge has suffered mechanical damage but is partially preserved. Clear striations run parallel to the edge. Five imitation rivets. Ornamentation: Uppermost on the hilt there is a plain band, under

3. DJM artefact registration numbers X1-X8 correspond to National Museum Inv. nos. B17617-B17624 respectively.

Fig. 5-5b. Sword X1 and detail of the pommel.

Fig. 6-6b. Sword X2 and detail of the pommel

Fig. 7-7b. Sword X3 and detail of the pommel.

Fig. 8-8b. Sword X4 and detail of the pommel.

Figs. 5 – 12 by Søren Harbo Andersen. Figs. 2-3 by the authors.

Fig. 9-9b. Sword X5 and detail of the haft and pommel.

Fig. 10-10b. Sword X6 and detail of the haft and pommel.

Fig. 11-11b. Sword X7 and detail of the pommel.

Fig. 12-12b. Sword X8 and detail of the haft and pommel.

this a group comprising two sets of closely-spaced lines bordered by alternating hatched triangles, forming plain lozenges. Framed uppermost by a row of dots, lowermost by small double arches. Separated from these and from each other by plain bands there are two further sets of closely-spaced lines, each framed by double arches (three on each side of the hilt). There is a row of dots around the rivets, along the two forks and in the arch of the hilt. On the pommel, there are five lines around the edge and within these stacks of four-five small arches, forming a row. Within this, with the length of the crest as their diameter, there are five lines surrounded by rows of dots. On the blade, a V-shaped feature extends from the forked tips of the hilt. This is formed by an approximately 0.5 cm broad band which is broadest in its central part. The band is completely filled out with transverse bundles of short strokes or flat arches. The feature is bordered by very fine rows of dots (Fig. 5).

X2 (B17618). Bronze-hilted sword broken into three pieces. The outermost c. 3 cm is missing. The breaks lie just before the middle of the sword and near the tip. The edge is corroded and partially preserved. One side of the hilt is heavily corroded. The crest of the hilt is slightly displaced relative to the middle of the pommel. It has five imitation rivets which on the two sides are slightly displaced relative to one another. The rivets on one side are, moreover, arranged in a larger arch than on the other. The outermost rivet on one side is small and almost triangular. Ornamented as X1 apart from there being fewer lines innermost on the pommel (Fig. 6).

X3 (B17619). Bronze-hilted sword completely preserved. A few millimetres are missing from the tip. A little corrosion on the lowermost 3 cm of the blade which makes the edge uneven. A few examples of mechanical damage on the edge. A small notch caused by an agricultural implement can be seen on the edge of the pommel. Clear striations. Five imitation rivets. Ornamentation as X1 (Fig. 7).

X4 (B17620). Bronze-hilted sword broken into two pieces. The outermost 5 cm of the blade is missing. Very well preserved. A number of holes (from casting) in the surface of both the hilt and the blade. Clear striations. Five imitation rivets slightly displaced relative to each other on the two sides. Possible traces of "the hammer" used for hammering out the edge are seen as irregularities along the inner side of the edge facet. Ornamentation as X1 (Fig. 8).

X5 (B17621). Bronze-hilted sword. The outermost few millimetres of the blade are missing. The edge is partially corroded. A few holes in the blade from casting. Five imitation rivets which are slightly displaced on the two sides. Ornamented as X1 apart from a row of dots along the crest of the pommel (Fig. 9).

X6 (B17622). Bronze-hilted sword broken near the tip into two pieces. The outermost few millimetres of the blade are missing. Partially corroded. Occasional large holes in the blade from casting. Regular hammering traces 1.1-1.4 mm broad can be seen on the edge facet near the hilt and on the blade. Clear striations, which in some places can be seen to continue "through" the pattern. Five imitation rivets, more-or-less symmetrically arranged on the two sides. Ornamented as X1, apart from the lowermost set of lines on the "reverse" of the hilt, which is bordered upwards by alternating arches "waves!", as well as a row of dots along the crest of the pommel (Fig. 10).

X7 (B17623). Bronze-hilted sword. The outermost few centimetres of the blade are missing. Partially corroded and with a few notches in the blade. Has a heavy rough patination over the entire surface. Many holes from casting, especially on the blade. Clear striations can be seen on one side. Clear traces of hammering out on the edge facet, 1.2 cm long. Pommel slightly displaced from the centre. Four imitation rivets, which are only slightly displaced relative to one another on the two sides. Unornamented (Fig. 11).

X8 (B17624). Bronze-hilted sword. Preserved intact. The original surface can be seen on the greater part of the hilt. Partially dark brown or green patina. Four imitation rivets, slightly displaced from side to side. Ornamented: Uppermost on the hilt a blank zone. Below this a set of ten lines bordered uppermost by hatched triangles with their points upwards, lowermost by small arches. Below this a set of 6-7 lines bordered uppermost by small arches, lowermost by large double arches. Lowermost 6-7 lines bordered at the bottom by small arches. There are no rows of dots in the arch of the hilt. Pommel as X1 apart from that the inner rows of strokes are replaced by three lines around the crest itself. The V-feature on the blade is formed by an outer row of dots and two closely-spaced lines which, in towards the back of the blade, are edged by a row of small arches (Fig. 12).

Form

All the swords are short swords between 43.7 and 46.6 cm in length (average 44.7 cm for the intact examples). They have all been cast in one piece with imitation rivets. Six of the swords have five imitation rivets, two of them have four (X7, X8). The hilt arch on six of the swords is open and circular, whereas it is more closed and oval on two of them. The forked terminals of the hilt are in all cases set at an angle to the blade, but varies somewhat in their outline which is either straight, slightly convex or very slightly concave. The hilts are broadly pointed oval in cross-section. The pommels vary from almost circular (X1, X2, X3, X5, X6) to slightly oval (X4, X7, X8) and the long, (pointed) oval crests rise directly from the surface to a height of between 0.3 and 0.4 cm. The shoulders are rounded. The sword blades have a flared outline; they narrow sharply a little below the hilt and broaden again around the middle of the blade. As shown in table 1, the difference between the broadest and the narrowest point of the flare is only 0.5 cm throughout, but the form is further emphasised by the V-feature. The blades have a distinct mid-rib and their cross-section has the form of a flat rhombus. The hammered-out facet is clearly seen along the edge of the blades and in several places the individual hammer strokes can be distinguished. Striations from polishing can be seen on all the swords.

Ornamentation

X1, X2, X3, X4 and X5 have completely identical ornamentation on the blade and hilt (Figs. 13-14). X6 deviates in a few details, whereas X8 deviates with regard to rather more details on the blade and hilt (Fig. 14). Finally there is X7 which is without ornamentation (Fig. 11).

The V-feature on the blades begins at the terminals of the hilt arch and the two sides meet, after their characteristic curved course, at the back of the blade around its broadest extent. The V-feature is formed by a 0.5 cm broad band which around the middle becomes a few millimetres broader, which emphasises its curved form. The band is completely filled out with transverse bundles of strokes or flat arches and bordered by fine rows of dots (Fig. 13).

On X8 the V-feature is formed by an outer row of dots and two closely-spaced lines, which in towards the back of the blade are bordered by a row of small arches (Fig. 14).

The edges of the hilt and the imitation rivets are marked by a row of dots on all the swords, with the exception of X7. On X8 there are no rows of dots on the hilt terminals (Fig. 14).

The hilts of the swords all have their ornamentation organised into three zones with variations on sets of closely-spaced lines. X1-X6 have uppermost on the hilt a combination consisting of two sets of lines bordered by alternating hatched triangles which form blank lozenges. These are framed uppermost by a row of dots, lowermost by small double arches. Separated from this and from each other by blank sections are two arrangements of sets of lines, bordered by a double row of arches (Figs. 13-14).

On X8 the ornamentation of the hilt is also slightly different from that on the other swords. The upper set of lines is terminated uppermost by hatched triangles and lowermost by small arches. The lowermost set of lines is terminated by a double row of arches. The middle set of lines is bordered uppermost by small arches and lowermost by large double arches (Fig. 14).

The pommels have 3-5 lines along the edge, within this a circle is formed by stacks of 4-5 small arches forming a row. With the length of the crest as their diameter there are within this 2-3 lines which are surrounded by rows of dots (Fig. 5-8). On X5 and X6 there is a row of dots around the crest itself (Fig. 9-10). On X8 there are two lines around the crest itself, while the inner row of lines "is missing" (Fig. 12).

It has been shown that ornamentation in the Early Bronze Age, rather than being punched in after casting, was produced by a technique where the decoration was cut or punched into the wax form prior to casting (Rønne 1989, 126-143; 1991, 32-49). Signs of punching in the wax form can be seen through small irregularities, which are continuously repeated, whereas engraving can be difficult to demonstrate (Rønne 1991, 45). We have not been able to find any visible signs of punches on the Dystrup swords, but the ornamentation appears, however, so sharp and without traces of single punch-marks that it seems probable that it was carried out on the wax form prior to casting. There are, furthermore, clear striations on the surface of the swords which appear to be secondary relative to the decoration.

It is tempting to interpret the unornamented sword in the Dystrup find as an unfinished example. A piece,

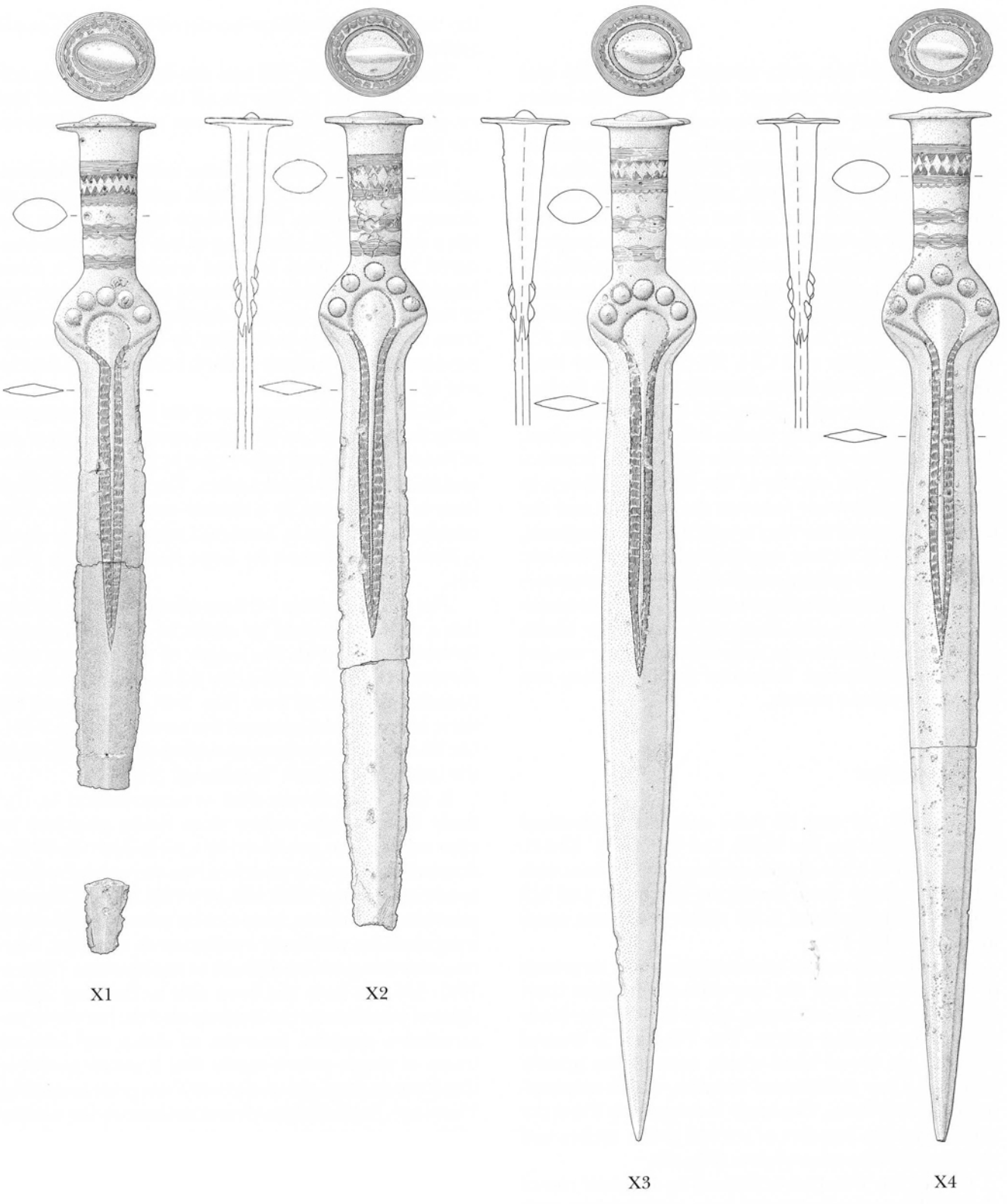


Fig. 13. The Dystrup swords X1-4. Scale 2:5.
Drawings: Malgorzata Hansen.

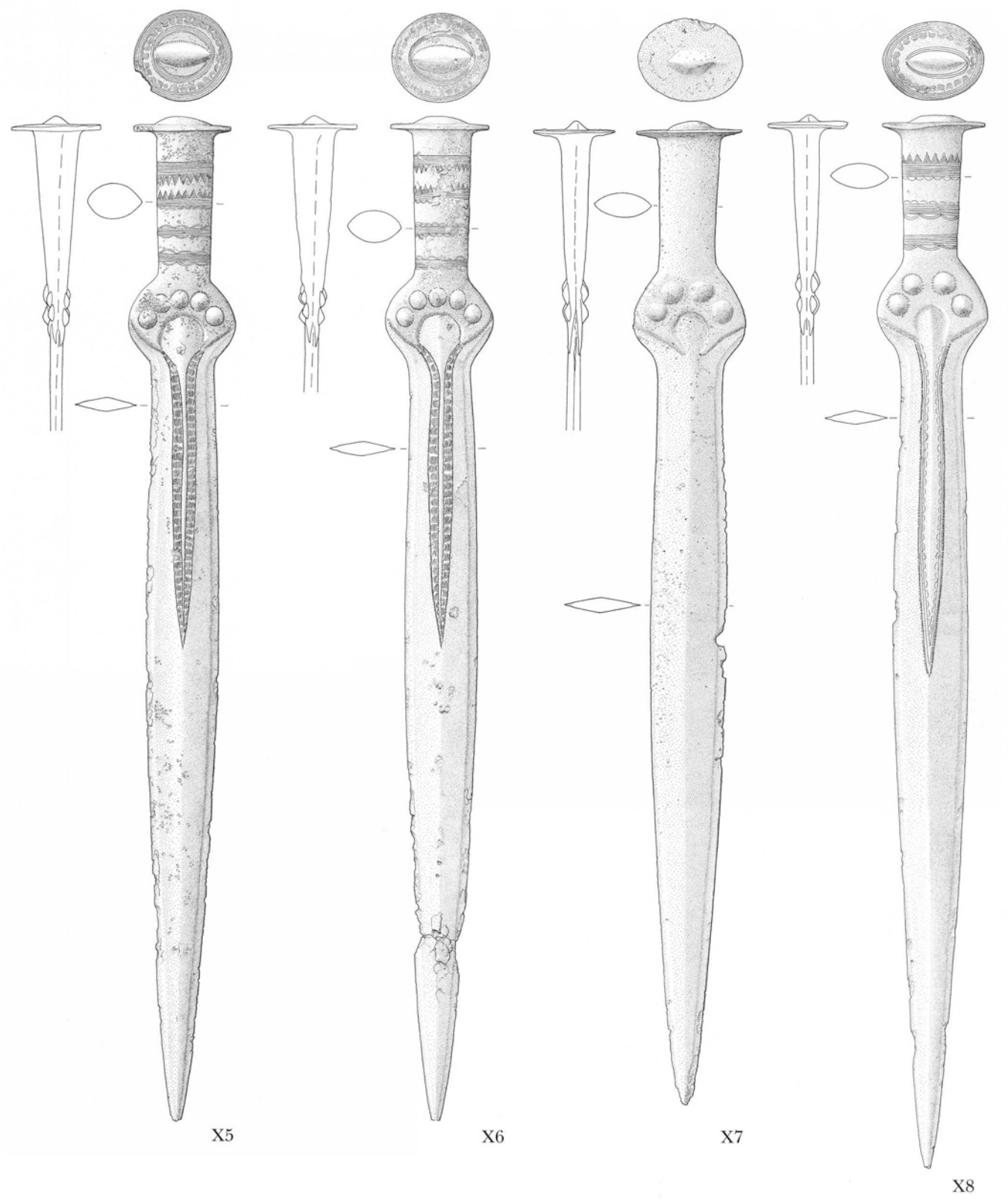


Fig. 14. The Dystrup swords X5-8. Scale 2:5.
Drawings: Malgorzata Hansen.

SWORD	X1	X2	X3	X4	X5	X6	X7	X8
A	32,7	40,7	44,7	44,9	44,3	44,5	43,5	46,5
B	8,5	7,7	8,6	8,2	8,8	8,8	8,5	8,5
C	5,7	6	6,4	5,9	6,6	6,3	5,4	5,5
D1	2,7	2,6	2,6	2,9	2,6	2,6	2,8	2,9
D2	2,3	2,2	2,3	2,5	2,4	2,3	2,5	2,45
E1	1,9	1,6	1,9	1,6	1,9	1,9	1,4	1,2
E2	1,1	1	1	0,9	1	1,1	0,85	0,8
F	4,35	4,2	4,3	4,5	4,2	4,4	5,1	4,6
G	3,9	3,7	3,9	3,6	4	3,8	3,7	3,5
H	2,6	2,7	2,4	2	2,6	2,8	2,2	2,7
I	1,1	0,6	1,1	0,65	1,1	1,1	1	1
K	0,4	0,35				0,35	0,4	
L	4,7	4,7	4,7	5,2	4,8	4,8	5	5
M	1,7	1,8	2	1,6	1,8	1,9	0,7	1,2
N	1,6	1,8	1,3	1,8	1,4	1,5	1,8	1,5
O	3,1	3,1	3,2	3,2	3,2	3,2	3,4	3,4
P		2,7	2,8	2,7	2,8	2,7	2,9	2,75
R	0,35	0,4	0,32		0,4	0,5	0,45	0,4
S	15,6	15	15,9	15,6	14,5	14,7		16,1
T	0,6	0,57	0,6	0,6	0,6	0,6	0,7	0,65
U	37,1	36	36,2	37,2	36	36,2		
V	385	336	423	395	418	400	355	398
X	45,6	43,7	44,8	45,4	44,8	45	43,7	46,6

Table 1. Measurements of all swords in cms and their weight.

LEGEND	
A	Preserved length
B	Hilt, lenght from top of pommel to lower part of hilt plate
C	Hilt, lenght from lower part of pommel to the transition from hilt to hilt plate
D1	Hilt, upper width
D2	Hilt, lower width
E1	Hilt, upper thickness
E2	Hilt, lower thickness
F	Pommel, length
G	Pommel, width
H	Pommel crest, length
I	Pommel crest, width
K	Pommel crest, height
L	Hilt plate, width
M	Hilt arch, distance between lozenges
N	Hilt arch, distance from lozenge tips to bottom
O	Blade, max. width
P	Blade min. width between hilt and middle af blade
R	Blade edge, width
S	V-shaped feature on blade, length from tip to hilt arch
T	Blade, max. thickness
U	Blade, estimated original length from tip to hilt arch
V	Weight in grammes
X	Total lenght, reconstructed

which could be decorated as desired. The arguments against punching as the usual decoration technique are, however, so convincing, that we are inclined to believe that it was the intention that the sword was without decoration. The sword deviates from the others with its slightly coarser surface and heavier patination, which can be due to events prior to deposition.

Identification and dating

The short swords from Dystrup can be fitted into Lomborg's Fårdrup horizon as copies of swords of Hajdusámson-Apa type (Lomborg 1969, 97-99; 1959, 93ff.; Vandkilde 1996, 224ff.). Both formally and stylistically there is close agreement between the Dystrup swords and the swords from Torupgårde, Stensgård and Sandbygård, which are seen as being genuine, imported Hajdusámson-Apa types. The Hajdusámson-Apa swords have five rivets, as have six of the Dystrup swords, or four rivets and a more closed hilt arch as on the two others from Dystrup. Furthermore, the blade and hilt are often cast separately and most often the two lowest rivets are genuine or imitation ring rivets. The pommel can be a loose pin (Fig. 15). In contrast to this, all the Dystrup swords have been cast in one piece. The mid-rib of the blade is less protruding and the cross-section of the hilt and the pommel are not all as round, but slightly oval. The most oval of the pommels are those on the two swords with four rivets, which tend to be arranged to form a trapezium. Others deviate only in detail from the other swords in the find. There is no doubt that all the swords must be variations of the same type.

Four rivets arranged in a trapezium is mentioned as a later feature of the Hajdusámson-Apa swords and daggers. The same is said to apply to the thinner blade, which is clearly drawn in under the hilt. These swords and daggers have features in common with the Wohlde blades, but according to Willroth it cannot be determined whether these are variants of Hajdusámson-Apa swords or independent later types in the Apa tradition under the influence of Wohlde-like blades (Willroth 1985, 62; Sicherl 1996, 294). In connection with this, reference can also be made to three very similar daggers from Sweden which, according to Lomborg, are copies of the Apa type of sword (Lomborg 1959, 96; Forssander 1936, taf. XLVI). The two swords with four rivets from Dystrup are, in terms of form, close to these daggers and, furthermore, also to the Guldbjerg dagger (Ke 3, taf. 94, 1882). According to Willroth, the daggers, together with the sword from Bøgeskov (Ke 3, taf. 55, 1682), belong to a later part of period I (Willroth 1985, 62).

The find from Dystrup shows that swords with five and four rivets can be contemporaneous. The variations mentioned above can be seen partly as domestic traits, partly as a mixture of styles, as occurs both on the Continent and between Middle Danubian (Carpathian) and Siebenbürgian (Central European) swords and in Southern Scandinavia between swords of the Valsømagle and Fårdrup horizons (Lomborg 1959, 97; Vandkilde 1996, 224ff & 236). There is not, however, as marked a mixture of styles as one for example sees on the dagger from Allerslev (Lomborg 1059b, 97).

The unornamented sword from Dystrup distinguishes itself from the others solely by its lack of ornamentation. It is worth noting that only few of the early swords are of any significant length. This applies to the Danish swords from Torupgårde, Stensgård, Sandbygård and the possibly slightly later example from Engestofte (Lomborg 1959, 121; Ke 3, taf. 55, 1682). The swords from the Hajdusámson and Apa hoards are, on the contrary, on average only 50 cm long and those from the Zájta hoard are only a few centimetres longer. The other examples from Denmark are daggers, all less than 35 cm in length. On the contrary, several of the Sögeler and Wohlde blades appear to be of a length such that when they are hafted they become short swords of approximately the same length as the Dystrup swords[4]. The swords from Dystrup, with an estimated length of between 43.7 and 46.6 cm, are thus considerably shorter than the Danish swords of Hajdusámson-Apa type, but considerably longer than the daggers. On the other hand, they are only a few centimetres shorter than the European swords of similar type.

No other swords or daggers are known with exactly the same ornamentation as the Dystrup swords. Similar single elements and patterns are, however,

4. Calculated on the basis of the measurements on drawings in Hachmann 1957 and Kerstin & Arner 2 and 3. In research so far there is no uniform defination for distinguishing swords, short swords and daggers. Willroth puts the boundary between swords and daggers at 30 cm (Willroth 1985,63)

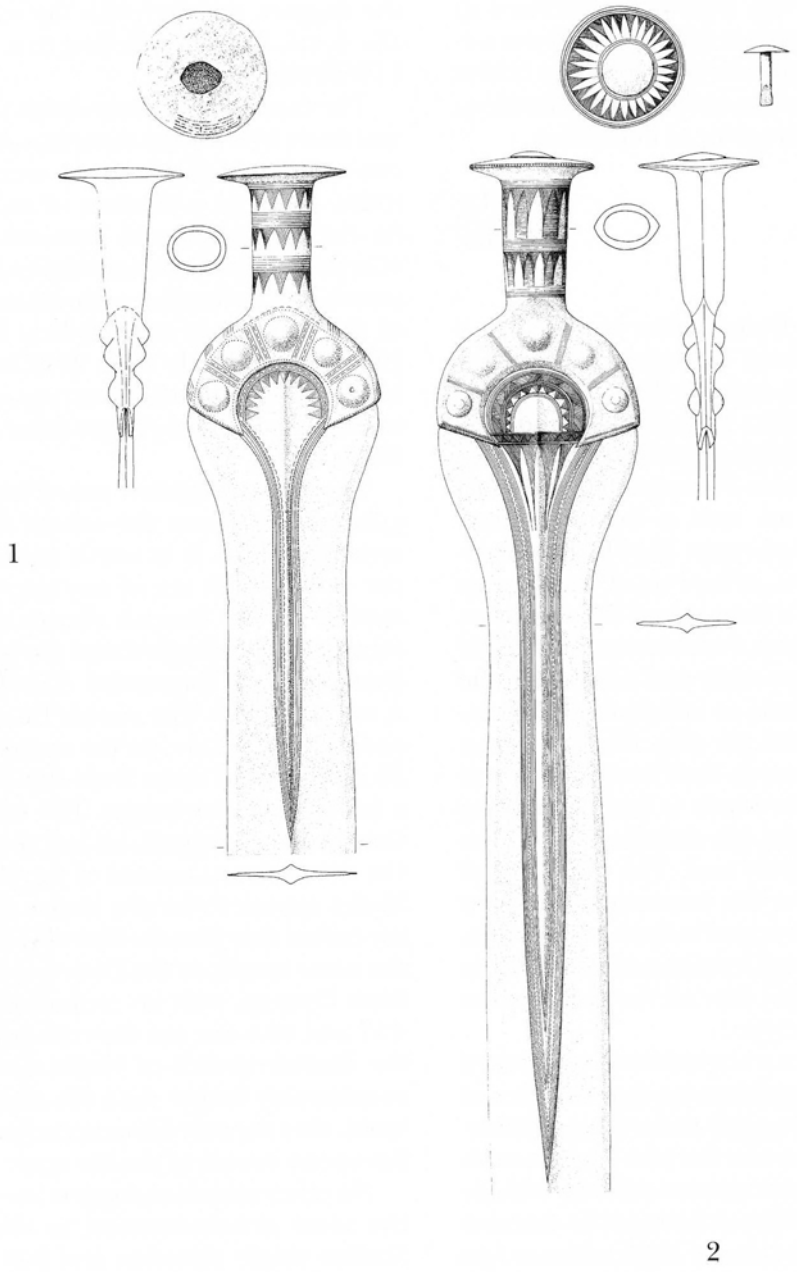
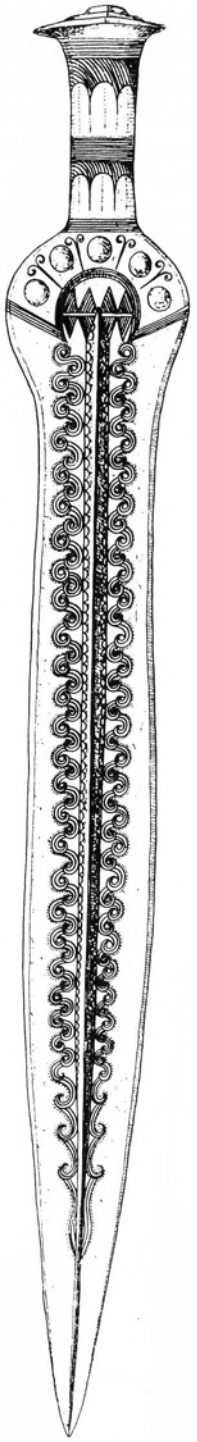


Fig. 15. Swords from the danish hoards of 1)Torupgårde and 2)Stensgård (Ke 3 Taf. 146), from the hoard of 3)Hajdúsámson (Hachmann 1957 Taf. 64,1) and from the hoard of 4-5)Apa (Hachmann 1957 Taf. 63,2-3).



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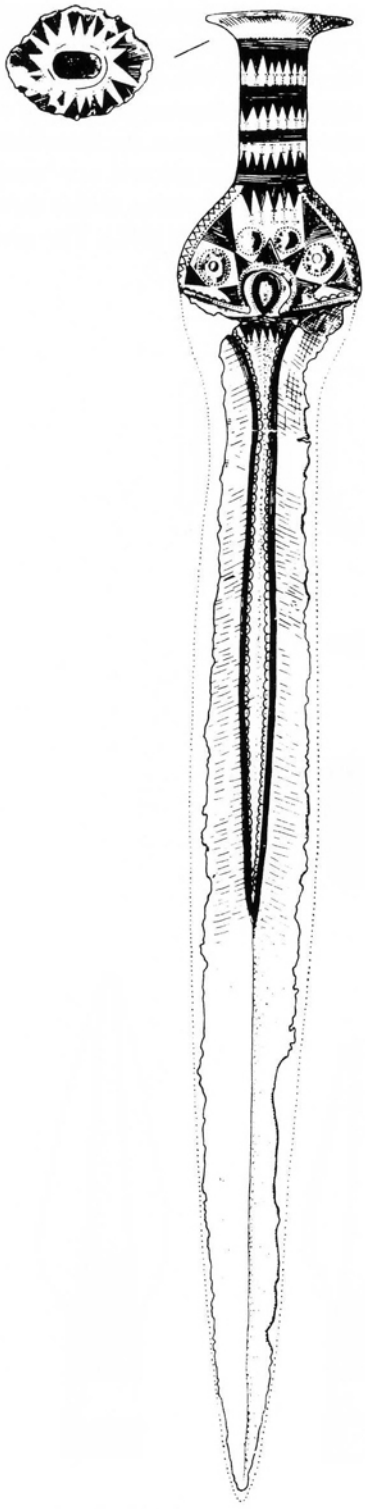

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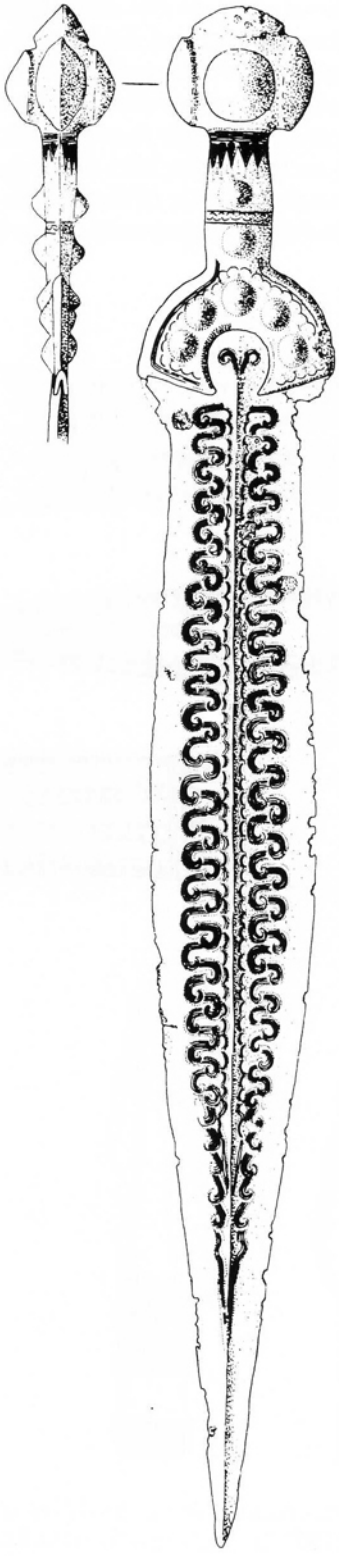

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seen on various early swords and daggers both from Southern Scandinavia and Europe. Ornaments and patterns are found, furthermore, in an almost identical form on other artefacts in the Fårdrup style. Common features include the sets of lines, delimited by repeated arches on the hilts of the swords, and the hatched triangles. On six of the swords the latter are arranged alternating uppermost on the hilt producing a blank geometric pattern. This pattern is typical of the Bagterp spearheads and is seen in a similar form on the axes from Fårdrup (Fig. 16). The same pattern is known from one of the swords in the Zájta hoard, whereas the hatched triangles on the Hajdusámson-Apa swords are "suspended" (Fig. 17). Similar ornamentation is also seen on the curved swords (Lomborg 1959, 118ff.). The arches which border the sets of lines

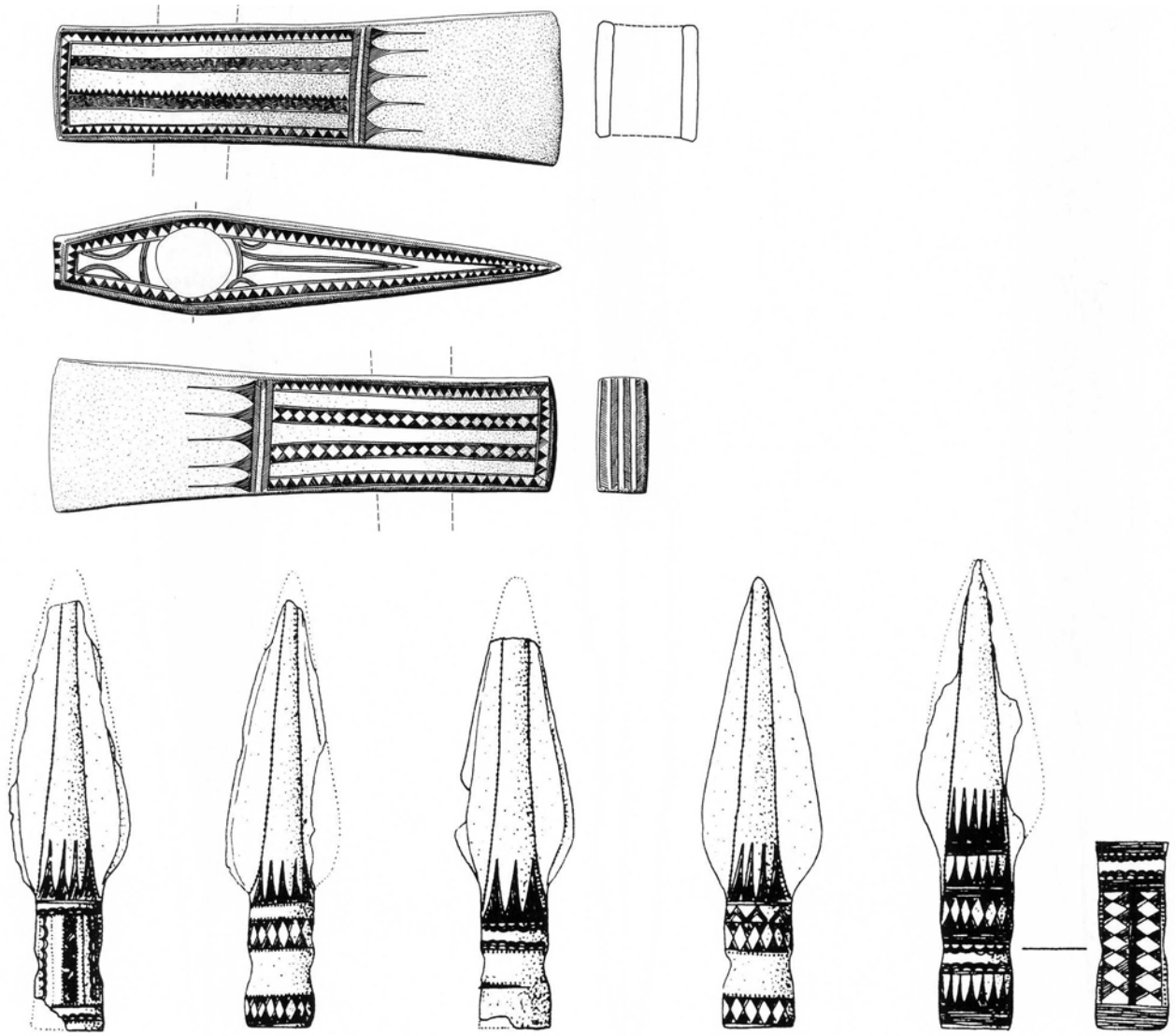

Fig. 16. Shafthole axe of Fårdrup type (Ke 2, Taf. 96, 1178). Spearheads of type Bagterp (Hachmann 1957 Taf. 27,8-11, 16).

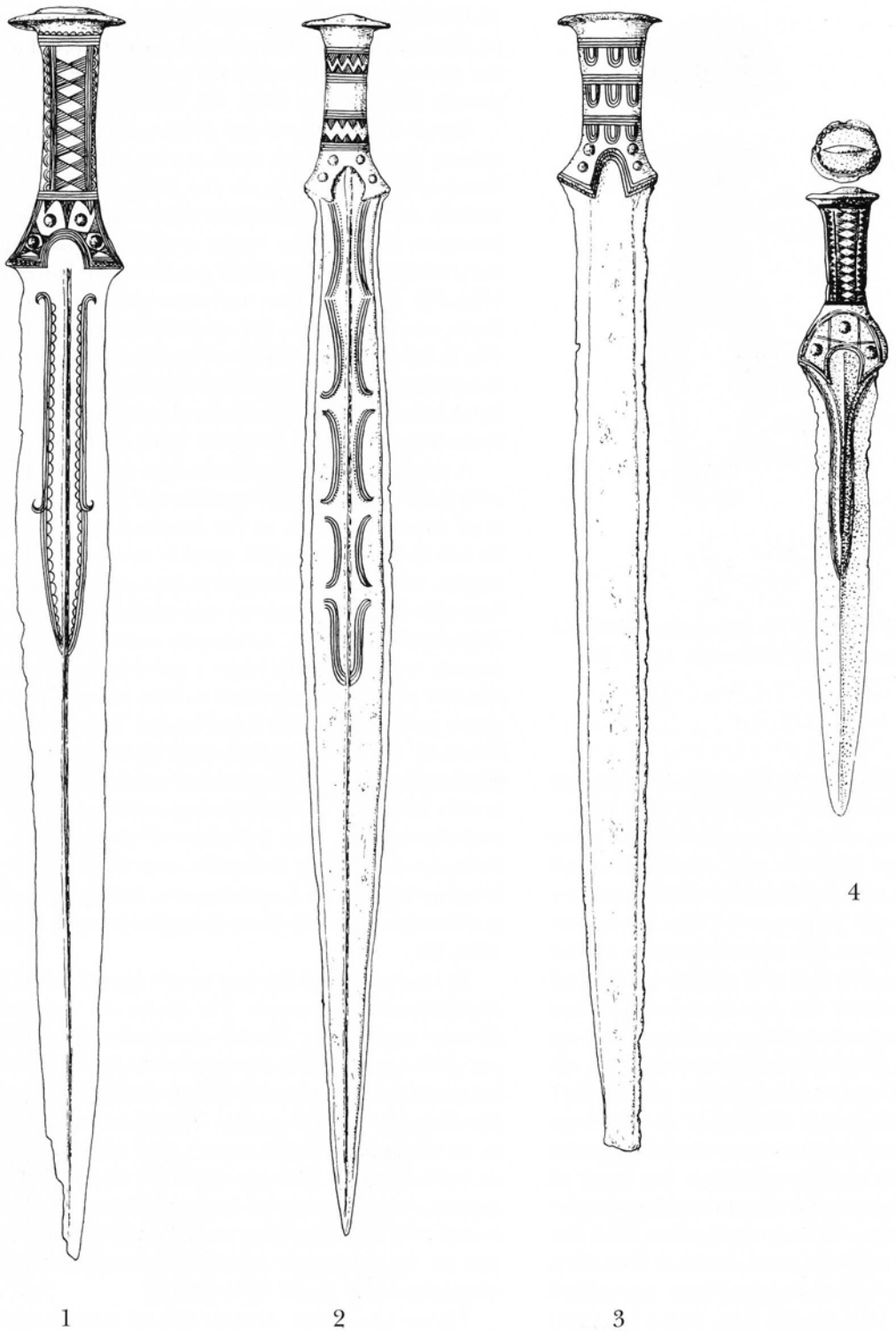

Fig 17. Swords 1-3) from the hoard of Zaita (Hachmann 1957, Taf. 65, 4) Dagger from Grenaa (Hachmann 1957, Taf. 19).

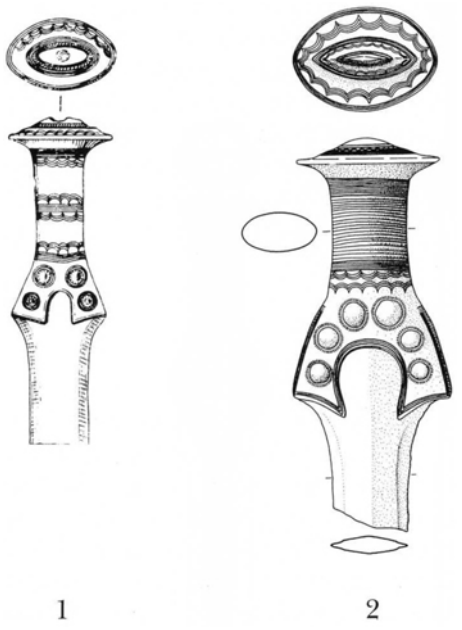

Fig 18. 1)Sword from the hoard of Au (Hachmann 1957 Taf. 49,18), 2)Sword from the hoard of Valsømagle (Ke 2, Taf. 80, 1098).

are an ornamental element which is typical of the Au-Valsømagle swords (Lomborg 1965, 226) (Fig. 18).

The ornamentation of the pommels is in all cases dominated by groups of lines and stacks of small arches, forming rows, which follow the circumference of the pommel. Only on X8 do we see that the innermost row of lines follows the circumference of the crest, whereas it is marked by a row of dots on X5 and X6. The Torupgård sword, the Apa sword and others have all hatched triangles forming a radial pattern on the pommel. The Au and Valsømagle swords have, on the contrary, rows of arches arranged in a "circular" pattern, which is reminiscent of that on the Dystrup swords (Fig. 18). The ornamentation on the majority of the Dystrup swords only emphasises the form of the pommel itself, whereas the ornamentation on the Au-Valsømagle and other swords emphasises both the form of the pommel and the crest. Several Southern Scandinavian bronze-hilted daggers have a pommel ornamented like the Valsømagle type and a hilt arch and rivet count of Hajdusámson-Apa type (Lomborg 1959b, 97). The same is the case for European swords such as Goldberg and Pella (Lomborg 1959, 74 & abb. 12-13; 1965, 225). Three Swedish daggers, about which no further information exists, have ornamentation on the pommel which is very close to that of the Dystrup swords (Forssander 1936, taf. XLVI).

Bands of transverse sets of lines forming an approximate zigzag pattern, such as that which fills out the band of the V-feature on the blades of the Dystrup swords, are not known from other swords. These are, however, seen on the upper surface of the large axe and on the side of the small axe from the Fårdrup find (Fig. 16). Bands of dots and rows of arches are known from, among others, the axes in the Bregninge find (Ke 2, taf. 55). The V-feature on Dystrup sword X8 has a combination of ornamental elements which is known from other bronze-hilted swords and, in several cases, from Sögeler blades (Sicherl 1996, 289) (Fig. 15).

A dagger of Hajdusámson-Apa type, of which it is only known that it was found in the parish of Grenaa, is of interest relative to the Dystrup swords, because its hilt is decorated with vertical rows of hatched triangles, which are arranged point to point form blank lozenges very like those on one of the swords from the Zájta hoard (Fig. 17). As already mentioned, six of the swords from Dystrup have a pattern uppermost on the hilt which corresponds to that on another of the three swords from the Zájta hoard. The patterns are, however, as already mentioned, also common on the Fårdrup bronzes. The pommel of the Grenaa dagger is very like that of the Dystrup swords both in form and decoration. The V-feature of the blade is, apart from the fact that it is double, exactly the same as on Dystrup sword X8. Lomborg sees the Grenaa dagger as a Nordic copy of the Siebenbürgian bronzes (Lomborg 1959, 96.

To summarise, the Dystrup swords have the same form as Hajdusámson-Apa swords. The blades are ornamented in the same way as these. The hilt ornamentation in the form of sets of lines and hatched triangles is like Hajdusámson-Apa, but resembles Zájta swords in pattern and has rows of arches like those from Au-Valsømagle. The pommel is not so round as on Hajdusámson-Apa swords, and not so pointed oval as Au-Valsømagle. The same applies to the crest which is not stepped and not so pointed oval as the latter. The pommel is ornamented with sets of lines and rows of arches very like those seen on Au-Valsømagle swords. Several of the ornamental compositions are "pure" Fårdrup style.

There are seven bronze-hilted swords and one bronze-hilted dagger of Hajdusámson-Apa type from Denmark. Few of them can, as already mentioned, be said to be genuine imported pieces (Lomborg

1959, 94; Vandkilde 1996, 224-225, Fig. 238) [5]. The others must be seen as copies, produced outside the Carpathian area. None of them has been found in a dated context, but as already mentioned Lomborg links them to the Fårdrup bronzes. The find situation for the Dystrup swords brings us no closer to a date for this type of sword in relation to domestic types.

All the previously known swords and daggers of Hajdusámson-Apa type, or close derivatives of these, are single finds. Even the short sword found in a grave at Guldbjerg was without accompanying finds (Lomborg 1959, 94ff.; Ke 3, taf. 94, 1882; Vandkilde 1996, 224). Swords and daggers of this type have generally been dated typologically to an early part of period I. As Lomborg, among others, points out, the type is different in style from, and not found together with, Valsømagle types (Lomborg 1969, 101). As Vandkilde argues, the Hajdusámson-Apa hoard horizon can best be matched with the Central European Bz. B1, although an early part of this. This implies that the swords from Denmark can be dated to her period IB and can be related to, among others, blades of Sögeler type (Vandkilde 1996, 143 & 225). As mentioned above, there are certain features of the Dystrup swords that can be compared with swords and daggers of Valsømagle type. This is also consistent with the fact that the different groups, Sögel-Wohlde, Valsømagle, Fårdrup and Hajdusámson-Apa, in period IB represent contemporaneous bronze craftsmanship with two different ornamental styles but with a common background in the ornamentation of the Carpathian bronzes (Vandkilde 1996, 256).

Sicherl believes he can prove that the origin of the bronze-hilted swords lies in the Upper Middle Danubian area, from where swords of Wohlde type are thought to originate and that it is from this area and not Eastern Hungary or Siebenbürgen that imported bronzes reached the Danish zone I (Sicherl 1996, 296). The Dystrup swords must be linked with the Fårdrup bronzes and be dated to period I (Vandkilde IB). It is difficult at present to decide on a more precise dating because, as has already been shown, they contain elements which traditionally are seen as being early, and elements which traditionally are seen as being later in the period.

5. In addition, a sword SIM 64/1996, recently acquired by Silkeborg Museum, which together with some now lost small bronzes, is said to have been found during house construction the Silkeborg area in 1865. The sword is just more than 50 cm in length and very crude in form. The blade is, for example, double the breadth of the Dystrup swords! The hilt is attached by way of five rivets, of which the two lowermost at least are genuine. The shoulders are sharply rounded and the blade gently flaring. The edge of the blade is bordered by five lines. The sword is not wholly typical of one of the early types, but has several characteristics which suggest this dating.

Find type

The Dystrup find is a monotype hoard. Monotype hoards and multitype hoards appear in approximately equal numbers in period IB and are both small find categories relative to graves and single depositions (Vandkilde 1996, Fig. 262). The Dystrup hoard can, furthermore, be characterised as a dry-land find. This is contrary to the majority of single depositions and hoards from the period which apparently presumed to be from bogs or other wet environments (Lomborg 1969, 99; Willroth 1985, 68). In a large number of cases the finding environment has been determined on the basis of the obvious patination on the bronzes and without knowledge of the actual circumstances of the find. The surface of the bronzes has not been analysed further, so "bog patina" is a subjective evaluation which cannot be the decisive factor in determining the find environment (Bodilsen 1989, 92). The sharp distinction between wetland and dry-land finds is, however, only of importance if the difference is considered significant. Levy distinguishes between ritual and non-ritual votive finds on the basis of whether they were found on dry land or wetland (Levy 1982, 24). The fundamental significance of bronzes that are deposited in one way or the other must be their symbolic value (Larsson 1986, 158). The depositions take place intentionally, but the specific reason is difficult to recognise. It is not, according to several researchers, possible to distinguish between secular and votive deposits (e.g. Willroth 1985, 228; Larsson 1986, 159). Whether the deposition takes place on dry land or wetland is thus without significance for their symbolic value. In a wider chronological perspective there is nevertheless a clear connection between water and hoards (Larsson 1986, 174ff.). Therefore a ritual value in connection with deposition in a wet environment could have been significant.

According to Willroth, hoards on dry land are

primarily found by or under stones. This applies for example to the second Valsømagle find (Willroth 1985, 213). Others are, however, of the opinion that it is not a particularly common practice for Bronze Age hoards in general (Bodilsen 1989, 95). We believe, however, that it is likely that there was a connection between the Dystrup hoard and the large stone that was removed from the field less than half a metre away. The stone is the only one of considerable size that has been registered from the area. It must have been involved in the depositional environment and have acted as a marker for the hoard.

Swords and daggers are, in particular, common in period IB deposits. In monotype hoards they comprise around 10% of the finds, even less in multitype hoards (Vandkilde 1996, Figs. 268-270). The Danish swords and daggers of Hajdusámson-Apa type can, apart from the Guldbjerg dagger that lay in a grave, be perceived as single depositions which can be interpreted in accordance with other hoards (Willroth 1985; Bodilsen 1989, 93). Typical period IB monotype hoards contain the following in order of abundance: Fårdrup axes, Bagterp spearheads and flanged working axes. They are closely linked to single depositions, which most commonly are flanged working axes, Fårdrup axes and spearheads. Other types are rare, but swords represent the fourth largest category (Vandkilde 1996, Fig. 268-270, (276-277)). Dystrup is, however, unusual due to the many swords in one find. By weight, the eight swords represent approximately the same amount of metal as the great axe in the Fårdrup hoard (tab. 1, V) (Malmer 1989, tab. 1).

Hajdusámson-Apa swords and daggers are, like the Fårdrup bronzes, artefacts which in particular are found deposited in hoards, not in graves. The Dystrup hoard is, in this respect, "normal" for the style and the period, beyond this, the hoard is totally unique for the period. It is without parallel in either Southern Scandinavia or Europe.

Provenance

Traditionally, the bronze-hilted swords and daggers of Hajdusámson-Apa type are seen as Nordic copies and imitations when they are produced more simply with the blade and hilt cast in one piece (Lomborg 1959, 96). On the contrary, it is not possible on the basis of an "quality assessment" to decide whether the pieces were imported or are copies (Lomborg 1965, 228). On the basis of the first-mentioned criterion, the Dystrup swords must be locally produced. Furthermore, a series of factors can be highlighted which suggest that the swords were produced locally. Six of them are so similar that they must be based on the same model. Only small details, which can be attributed to variations in the production process, distinguish them from each other. This applies both to their form and their ornamentation. The other two swords are also similar, apart from the fact that one of them is without ornamentation. All the swords appear to be without visible signs of wear or damage and the ornamentation appears sharply defined and also unworn. They had either been used very little or not at all before they were deposited. There are several obvious holes or blisters in the surface of the swords, which gives the bronze a certain porosity. This is also typical of other early Nordic bronzes [6] (Malmer 1989, 19).

In 1969 Lomborg, in his Fårdrup horizon, assigned a series of types to an early part of period I. These have in common geometric ornamentation lacking spirals in contrast to the Valsømagle horizon in late period I (Lomborg 1969, 96ff.). As explained above, it is not possible to distinguish the two styles clearly in time and space, but together with the Hajdusámson-Apa and Sögel-Wohlde bronzes they can be seen as complementary, subject to different rules for use in different areas (Vandkilde 1996, 256-267). As suggested by Vandkilde, the Fårdrup bronzes, especially in the form of socketed axes and spearheads of Bagterp type, could comprise the hoards and single finds of the Sögel-Wohlde sphere in zone II. The Fårdrup and Valsømagle bronzes are complementary in the same way. The Valsømagle bronzes can be seen as defining the grave element of Fårdrup craftsmanship in zone I. The Hajdusámson-Apa bronze craftsmanship (imported swords and daggers and close imitations of these) is limited to zone I and are primarily a hoard and single deposition horizon (Fig. 19). The two groups are very closely linked stylistically. This also prompted Lomborg to assign them to the Fårdrup horizon, whereas Vandkilde, on the basis of correspondence analysis, has them at least partly separated (Vandkilde 1996, Fig. 275).

The ornamental elements of the Dystrup swords

6. Lomborg mentions this feature as typical for the curved swords and is of the opinion that it is not common for Nordic bronzes (Lomborg 1959b, 118).

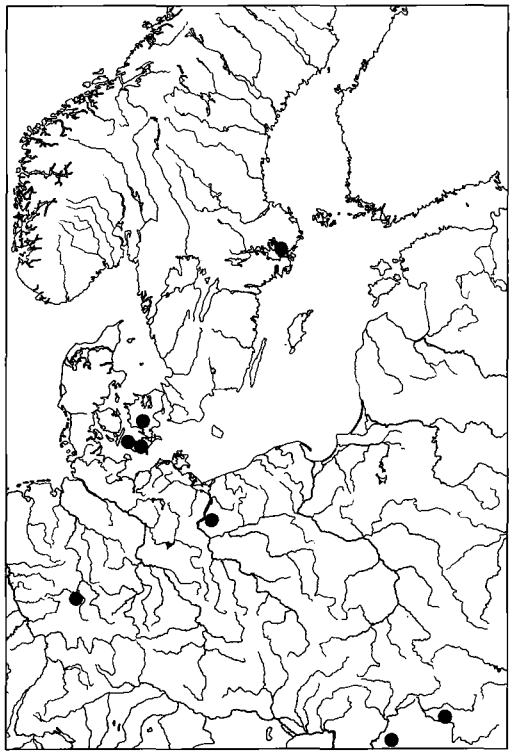

Fig 19. The distribution of swords and daggers af Hajdúsámson-Apa type.

are, as is apparent, a little more in accordance with, for example, those of the Fårdrup axes than, for example, those of the Torupgårde and Stensgård swords (Ke 3, taf. 146). The swords' ornamental elements can be recognised on various other types of sword from the period, but are combined such that the style is closer to the Southern Scandinavian Fårdrup style than that on any of the Central European bronzes. It is therefore obvious to conclude that the swords were made locally, where the preference was for these particular style elements among many others. Furthermore, it is striking that no two swords or daggers from the period show so great a similarity to each other as the six swords from Dystrup. It is characteristic of the period's swords and daggers of the same type that certain elements differ and vary within relatively wide limits. As mentioned earlier, the elements are, however, found mixed across the types. This is also the case for the Dystrup swords, and also in this respect they are remarkably similar. The swords must have been made at the same place, in the same workshop, and there is nothing to suggest that this was not local in the broad sense of the word. The fact that this probably was the case is shown by results of analyses from Zealand from the Early Bronze Age period II. Here Rønne has demonstrated several local areas, each with its own particular preferences with regard to ornamentation (Rønne 1986, 71-124). This could suggest that production and distribution, at least in part, took place within small geographic areas (Levy 1991, 69).

Finally, the flint-edged sword from Åtte is often mentioned as an imitation of a bronze-hilted sword (Hajdusámson-Apa sword). According to the accepted reconstruction of the hilt, the Åtte sword is of about the same length as the Dystrup swords. Similarly, the form with the flared blade is very clear. Very probably many more flint-edged swords were in use than shown by the number of finds registered so far (Lomborg 1960, 146ff.; 1973, 61; Rønne 1988, 88ff.; Sicherl 1996, 197). The Dystrup find defines, with all clarity, the short sword as a type, and there were probably more of these in circulation than normally supposed. It is therefore likely that these short bronze-hilted swords were the direct models for the flint-edged swords such as that from Åtte. A link can therefore be made between hoard, grave and settlement finds that anchors the type in the domestic environment.

Period I in the local environment

Relative to the zonation of the Early Bronze Age, Dystrup is allocated to zone I. The zones are, however, defined according to groups of grave goods and without a certain number of grave finds it is therefore difficult to demonstrate whether specific characteristics are expressed locally.

In the local environment for the Dystrup find (NE Djursland) Early Bronze Age period I can be seen via settlements, graves and hoards.

Settlements. From the settlements of Egehøj and Hemmed Kirke there are two-aisled houses which can be dated to period I. The typical inventory in culture layers linked with these houses comprises pressure-flaked flint types such as sickles, daggers/strike-a-lights and arrowheads. In addition there are occasional insets for flint-edged swords (Boas 1991, Fig.16f.). There are no indications of bronze casting. Similarly, the use of bronze is only indirectly apparent (Boas 1983; 1993; 1997).

Graves. Local graves from the period rarely contain bronzes. Therefore, very few of these can be dated more precisely than to period I in general. From an area within a 5 km radius of the Dystrup hoard three Bronze Age burial mounds have been investigated in recent years. In a mound immediately west of the village of Ørum there were five graves with oak coffins lying parallel under a partially-common stone covering layer. One of the graves contained a slate pendant as grave goods, another contained a dagger-shaped strike-a-light. Otherwise only dental enamel remained. A burial mound had been raised over this, in which the central grave contained a belt-hook and a fragment of a dagger or sword blade, which cannot with certainty be determined to type [7]. Also in Ørum, a centrally-placed oak coffin containing two small amber buttons has been excavated. At the foot of the coffin stood a pot [8]. In Basland, a little to the south of the Dystrup hoard, an oak coffin without grave goods but with enamel has been excavated [9]. From Svapkær, Rimsø parish, there are two parallel oak coffin graves, of which one contained two flint arrowheads, the other a slate pendant; dental enamel was also present in both cases [10].

From the passage grave Brøndhøj, Enslev parish, comes the well-known find of a bronze pin with a globular head and a *"noppenring"* of gold. The bronze pin is a characteristic type for Bz. A2 (Lomborg 1973, 145ff., Fig. 84). Finally, mention should be made of Diverhøj, Homå parish, which contained a flanged axe of Valsømagle type, a strike-a-light and two fibulae. The latter give a late date in period I or early period II (Asingh 1987, 130ff.). The same applies to an 18 cm long wheel-headed pin of bronze, found at the head end of a grave. The grave had been built parallel to, and close by, a similar inhumation grave lacking grave goods. Both had been cut down slightly into the subsoil under a mound at Baunehøje near Koed (Boas 1979, 41-48).

Single finds. Single finds from the area comprise five flanged axes, a Fårdrup axe and a dagger of Hajdusám-son-Apa type (Fig. 17). A dagger of Valsømagle type from Albøge is said to come from a grave (Lomborg 1959, 87). A belt-hook was found on a field in Kolindsund. One of the flanged axes can be dated to period IA, one to period I in general and the remainder to period IB [11]. A fragment of an ornamented stone axe with among other things a V-feature from the shaft-hole out to the edge on the narrow side of the axe is known from Glæsborg parish[12].

The finds from the local area are not extensive but seen collectively they reflect a normal situation in zone I with the few Valsømagle types in the graves and Fårdrup types in the hoards. The graves with few or no grave goods can be dated to some time within period I.

Further inferences

As mentioned above, the Dystrup swords could have been produced locally in the same workshop. This could for that matter have been located in the local area, perhaps even at the find site. The settlement remains that were registered immediately around the hoard were later than the hoard itself. The probability that there was also a settlement here in period I cannot, however, be totally excluded, as a full investigation involving, for example, removal of the culture layer containing later settlement material, was not carried out. The demonstration of a contemporaneous settlement does not permit either the confirmation or the rejection of bronze production, nor does it permit localisation of such an activity. In contrast to the Late Bronze Age, there are no finds from period I of the Bronze Age to suggest that bronze casting or bronze working was linked to the settlements (Rønne 1989, 99-112; Levy 1991, 65f.). It has been suggested that there was a bipartite organisation of bronze handicraft in period IB of zone I. Specialists linked to the social elite produced the technically demanding

7. DJM 2583

8. DJM 2664

9. DJM 2621

10. Kulturhistorisk Museum Randers j.no. 88/68.

11. Vandkilde 1996, catalogue no. 373 ty. C1, no. 483 ty. C3, no. 520 ty. C4, no. 543 ty. C7.

12. DJM 2145, NM B17467

and sophisticated Valsømagle artefacts, while the more simple and traditional Fårdrup artefacts were made by independent smiths, who worked for the local community from a local base (Levy 1991, 69; Vandkilde 1996, 265).

Who and what does the hoard from Dystrup represent? What is its social context? Even though the hoard was deposited in a dry environment, and its contents, in principle, could have been re-absorbed into circulation, its ritual potential was not of minor significance. The function of hoards is related primarily to the symbolic sphere in society (Larsson 1986, 159). They can be perceived as gifts to divine powers and they demonstrate prestige and status relative to other groups, and, for example, legitimise an elite. Even though graves also represent depositions of valuable items, it can be presumed that the activities surrounding a burial served a different purpose in society than that served by the deposition of hoards (Larsson 1986, 159ff.; Vandkilde 1996, 276). In general it can be said that hoards mark the collective aspect in a society in contrast to the individual aspects which can be expressed in graves. The large number of swords in the Dystrup find represents without doubt a very great material value and not least a great symbolic strength. Weapons can be seen as symbols showing that competition and rivalry between groups or individuals has been incorporated into society. They are symbols of prestige and power. The hoards can be seen as being part of a general hierarchy with single depositions lowermost, monotype hoards in the middle and multitype hoards uppermost (Vandkilde 1996, 246). The Dystrup hoard is a monotype hoard and should therefore lie in the middle of the hierarchy, but with its content of eight swords is a very unusual monotype hoard. Its contents should perhaps be seen in the light of the fact that there appears generally to be less difference between the top and bottom of the hierarchical structure than previously thought (Vandkilde 1996, 289). The multitype hoards of this period have fewer categories of artefacts and are more uniform than is the case in the preceding periods; a certain harmonisation had taken place. This could be due to the fact that in period IB an elite was under construction and that this is manifested in the Valsømagle bronzes. The Fårdrup bronzes represent, conversely, the traditional social group (Larsson 1986, 185; Vandkilde 1996, 276 & 291). Finally, the many swords can be seen as the unique and extraordinary contents of a monotype hoard and as such should be perceived as a special zone I period IB phenomenon in accordance with other high prestige artefacts (Vandkilde 1996, 303).

Conclusion

The eight swords from Dystrup constitute a monotype hoard deposited at a shallow depth on dry land, originally close to a large stone. In the immediate vicinity there are both settlements and burial mounds from the Bronze Age, but these are mainly later than the swords themselves. The possibilities with regard to settlement at the actual find site have not, however, been thoroughly investigated. All the swords are short swords with an estimated total length of between 43.7 and 46.6 cm. All were cast in one piece with four or five imitation rivets. Six of them are identically ornamented, one deviates somewhat and one is unornamented. The form is typical of the imported Hajdusámson-Apa swords and daggers and imitations of these. The ornamentation is similarly typical of the early swords but is composed of elements from different types of European sword and from the local Fårdrup bronzes. The link to the Fårdrup bronzes dates the swords to the Early Bronze Age period I (Vandkilde IB).

The stylistic similarity to the Fårdrup bronzes, the swords' great mutual similarity, certain technical details and the formal similarity to the flint-edged swords, confirm that the swords were locally produced, perhaps in the same workshop – whether this was in Southern Scandinavia in general or in the actual area where they were found.

Locally, the Dystrup find is anchored in a traditional period I, zone I environment in which the settlements comprise large two-aisled houses with no remains of bronze implements but with ones of flint. Hoards are represented by single finds such as a dagger of Hajdusámson-Apa type. The graves in the area are also poor in bronzes, but occasional examples are rich and contain pieces of Valsømagle type. The unusually large number of swords in the offering at Dystrup have great symbolic strength which demonstrates the group's prestige and power in relation to other groups. The extraordinary nature of the find must probably to be viewed in the light of changes in the social system and the construction of an elite which manifested itself even more strongly in the subsequent period.

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References

Aner, E. & Kersten K 1973: *Die Funde der älteren Bronzezeit des nordischen Kreises in Dänemark, Schleswig-Holstein und Niedersachsen.* Band 1-3. København & Neumünster

Asingh, P. 1988: Diverhøj - A Complex Burial Mound and a Neolithic Settlement. *Journal of Danish Archaeology 6, p. 130 - 154.*

Boas, N. A. 1979:

Boas, N. A. 1983: Egehøj. A Settlement frao the Early Bronze Age in East Jutland. *Journal of Danish Archaeology* 2, p. 90 - 101.

Boas, N. A. 1991: Bronze Age Houses at Hemmed Church, East Jutland. *Journal of Danish Archaeology* 8, p. 88 - 107.

Boas, N. A. 1993: Late Neolithic and Bronze Age Settlements at Hemmed Church and Hemmed Plantation, East Jutland. *Journal of Danish Archaeology* 10, p. 119 - 135.

Boas, N. A. 1997: Settlements and Fields Covered by Sand Drift in the Bronze Age, Djursland, East Jutland. i J.J. Assendorp ed. *Internationale Archäeologie 38. Forschungen zur bronzezeitlichen Besiedlung in Nord- und Mitteleuropa,* pp. 16 - 29.

Bodilsen, I. 1989: Enkeltfund - Votivfund i dansk bronzealder. *Kuml* 1987, pp. 87 - 104.

Forssander, J. E. 1936: *Der ostskandinavische Norden während der ältesten Metallzeit Europas.* Lund.

Hachmann, R. 1957: *Die frühe Bronzezeit in Westlichen Ostseegebiet und ihre mittel- und südosteuropäischen Beziehungen.* Hamburg.

Larsson, T. B. 1986: *The Bronze Age Metalwork in Southern Sweden. Aspects of social and spatial organisation 1800 - 500 BC.* Umeå.

Levy, J. 1982: *Social and Religeous Organization in Bronze Age Denmark. An Analysis of Ritual Hoard Finds.* BAR International Series 124. Oxford.

Levy, J. 1991: Metalworking,Technology and <craft Specielization in Brinze Age Denmark. *Archeomaterials* 5, no. 1, p. 55 - 74.

Lomborg, E. 1959: Donauländische Kulturbeziehungen und die relativen Chronologie der frühen nordischen Bronzezeit. *Acta Archaeologica* 30, pp. 51 - 146.

Lomborg, E. 1960: Fladehuggede flintredskaber i gravfund fra ældre bronzealder. *Årbøger for Nordisk oldkyndighed og Historie* 1959, pp. 148 - 183.

Lomborg, E. 1965: Valsømagle und die frühe nordische Spiralornamentik. *Acta Archaeologica* 36, 1965, pp. 223 - 232.

Lomborg, E. 1969: Den tidlige bronzealders kronologi. *Årbøger for Nordisk Oldkyndighed og Historie* 1968, pp. 91 - 132.

Lomborg, E. 1973: *Die Flintdolche Dänemarks.* København.

Malmeer, M. P. 1989: Fårdrup-Yxornas metrologi och korologi - eet preliminärt meddelande. I J. Poulsen ed.: *Regionale forhold i Nordisk Bronzealder.* JAS Skrifter XXIV, pp. 19 - 28.

Rønne, P. 1986: Stilvariation i ældre bronzealder. *Årbog for Nordisk Oldkyndighed og Historie* 1986, pp. 71 - 124.

Rønne, P. 1988: Flintægsværd fra bronzealderen. *Årbøger for Nordisk Oldkyndighed og Historie* 1987, pp. 85 - 95.

Rønne, P. 1989: Fund af ældre bronzealders keramik og smedeværktøj fra Ordrup i Nordvestsjælland. *Årbøger for Nordisk Oldkyndighed og Historie* 1989, pp. 99 - 114.

Rønne, P. 1989: Early Bronze Age Spiral Ornament - the Technical Background. *Journal of Danish Archaeology* 8, pp. 126 - 143.

Rønne, P. 1991: Forsøgsarkæologi og bronzealderens ornamentik. I B. Madsen ed.: *Eksperimentel Arkæologi.* Historisk - Arkæologisk Forsøgscenter, Lejre, pp. 31 - 49.

Sicherl, B. 1996: Nochmals zu den ältesten Schwertformen Niedersachsens. *Die Kunde N.F.* 47 pp. 287 - 302.

Vandkilde, H. 1996: *From Stone to Bronze. The metalwork of the late neolithic and earliest bronze age in Denmark.* JAS Publications XXXII.

Willroth, K.-H. 1985: *Die Hortfunde der älteren Bronzezeit in Südschweden und auf den dänischen Inseln.* Offabücher 55. Neumünster.

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Torstorp Vesterby

A cemetery from the Late Roman Iron Age

by Eliza Fonnesbech-Sandberg (†)

Introduction

In the years 1987-1990, and again in 1992, the Archaeological Department of Copenhagen Regional Museum's Council at Søllerød Museum carried out extensive excavation campaigns at Torstorp Vesterby, in Høje-Taastrup District, 20 km west of Copenhagen. The reason was a planned expansion of the town over an area of 140.000 m^2. The area lies just less than 2 km southeast of the village of Høje-Taastrup; Torstorp Vesterby is a modern name. The area is almost flat, lying around the 25 m contour, and sloping down towards the southeast. The soils comprise heavy moraine clay. A large trial excavation in the first year revealed significant traces of settlement in the area. Accordingly, the topsoil was removed and an area of c. 70.000 m^2 was excavated the following year. During the course of the investigations it became clear that the settlement was even more extensive than first thought. In 1989 an extra reward came with the discovery of a small cemetery[1]. This cemetery from the Late Roman Iron Age will be dealt with in the following.

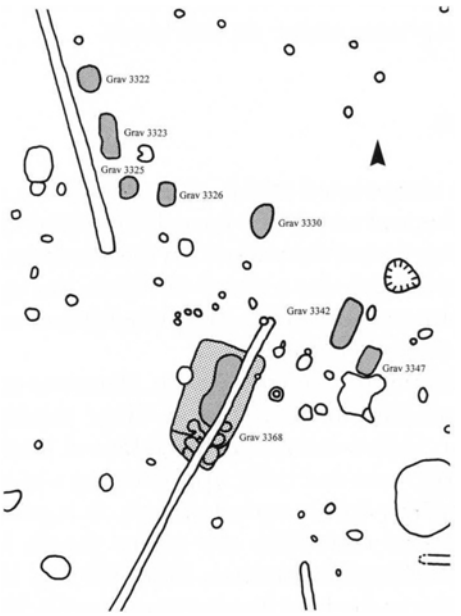


Fig. 1. Map of the cemetery. 1:200. Drawn by K.F. Paulmann.

The cemetery

The cemetery comprised eight graves (Fig. 1). Five of the graves were quite small, less than 1.2 m in length, while two graves were of medium length, up to 1.63 m. These graves contained sparse grave goods. The eighth grave was both deeper and larger than the others and was richly furnished.

Even though only one tooth was preserved in grave 3342 and only tooth enamel in grave 3330, it seems likely that the small graves were all inhumation graves. This is suggested by the grave goods and their posi-

[1]Archaeological Department of Copenhagen Regional Museum's Council, j. no SØL 295. Excavated by the author with the assistance of, among others, stud.mag. (now cand.mag.) Benny Staal and museum technician Kenneth Faye Paulmann. The settlement traces were from 84 buildings, both long houses and outhouses, primarily from two Iron Age farms – a western and an eastern. There were, however, also some settlement phases from the Neolithic, the Late Bronze Age and a couple of phases from the Viking Age. The settlement was not limited to the modern Torstorp Vesterby, as during a small excavation to the west of here several phases were found of the western Iron Age farm and perhaps yet more phases lie further out.

tion along with the dark (head) patches in some of the graves. The almost consistent placing of grave goods in the northern end of the graves must be interpreted in terms of the head having been laid to the north, just as in the three graves with preserved teeth or tooth enamel.

As the eight graves respect one another they were all presumably either marked on the surface with a stone or a small mound, or were dug at the same time. The four northwesternmost graves (3322-23, 3325-26) were aligned approximately north-south, whereas the remaining graves were oriented approximately northeast-southwest. This should perhaps be interpreted in terms of the graves having been dug in two phases (more on this later).

Grave 3322

The grave was pointed oval in plan, 91 x 75 cm, with sloping sides and an uneven base. It extended 11 cm below the surface of the subsoil. In the southern end of the grave there was a vessel of which the upper part had been removed either by ploughing or removal of the topsoil (Fig. 2).

Vessel: Remaining height: 7.8 cm. Diameter at the belly: 11 cm, and at base: 7.1 cm. Ware thickness: 0.8-1.1 cm. Yellow-brown to black-brown surface, coarse ware. Rounded belly, approaching a bi-conical form with a lightly rounded base. It is possibly a bi-segmented vessel like one of the vessels from Fraugde (Norling-Christensen 1956, 109 Fig. 13.5), which belong to the Late Roman Iron Age C3. There is, however, also the possibility that the vessel is tri-segmented.

Grave 3323

The grave was rectangular in plan, 147 x 69 cm, with both a vertical and a sloping long side and a flat base. It extended 9 cm below the surface of the subsoil. In the northern end of the grave, a little to the west of the centre in a circular dark area of the fill, lay an iron pin, as well as a red and a green glass bead. The dark coloration of the soil perhaps means that the head lay here.

The pin from grave 3323 was presumably broken off from a fibula and used as a funeral offering in its own right. It is 4.45 cm long. At one end the remains of a small piece of spiral can be seen. It cannot be dated precisely. The pin is apparently an expression of the re-use of a damaged fibula; it was probably used to fasten a dress or a shroud.

Grave 3325

The grave was almost rectangular in plan, 88 x 62 cm, with sloping sides and a slightly sloping base. It extended 7 cm below the surface of the subsoil. In the northeastern end of the grave stood a vessel of which the upper part had been removed by ploughing or by removal of the topsoil (Fig. 2).

Vessel: Remaining height: 9.8 cm. Diameter at the belly: 13.3 cm, and at the base: 8.5 cm. Ware thickness: 0.9-1.05 cm. Yellow-brown surface, coarse ware. The vessel approaches a bi-conical form with a lightly rounded belly break and a slightly concave base (Fig. 2). It could be a bi-segmented vessel like one of the vessels from Fraugde (Norling-Christensen 1956, 109 Fig. 13.5), which are dated on the basis of the grave's content to C3. The fact that it could be tri-segmented cannot, however, be excluded.

Grave 3326

The grave was almost rectangular in plan, 99 x 58 cm, with both a vertical and a sloping long side and a slightly uneven base. It extended 10 cm below the surface of the subsoil. In the northeastern end of the grave lay potsherds from an almost complete vessel. Beside these, approximately in the middle of the northern end of the grave, was a round dark patch, which perhaps shows where the head had lain. On the other side of this patch lay an amber bead (Fig. 3).

Vessel: Height c. 10.5 cm. Diameter at the rim: 10.6 cm, at the belly: 13.5 cm, and at the base: 6.5 cm. Ware thickness: 0.5-1.2 cm. Yellow-brown to black-brown surface, coarse ware. The vessel is tri-segmented, has a short flared neck/rim and bi-conical upper and lower part with a sharp belly break. The base is flat. With regard to form, it belongs in the Late Roman Iron Age.

Ulla Lund Hansen's pottery typology, as presented in connection with the Harpelev cemetery, has been used on the intact vessels from Torstorp Vesterby (Hansen 1976, 106ff.). The advantage of this typology

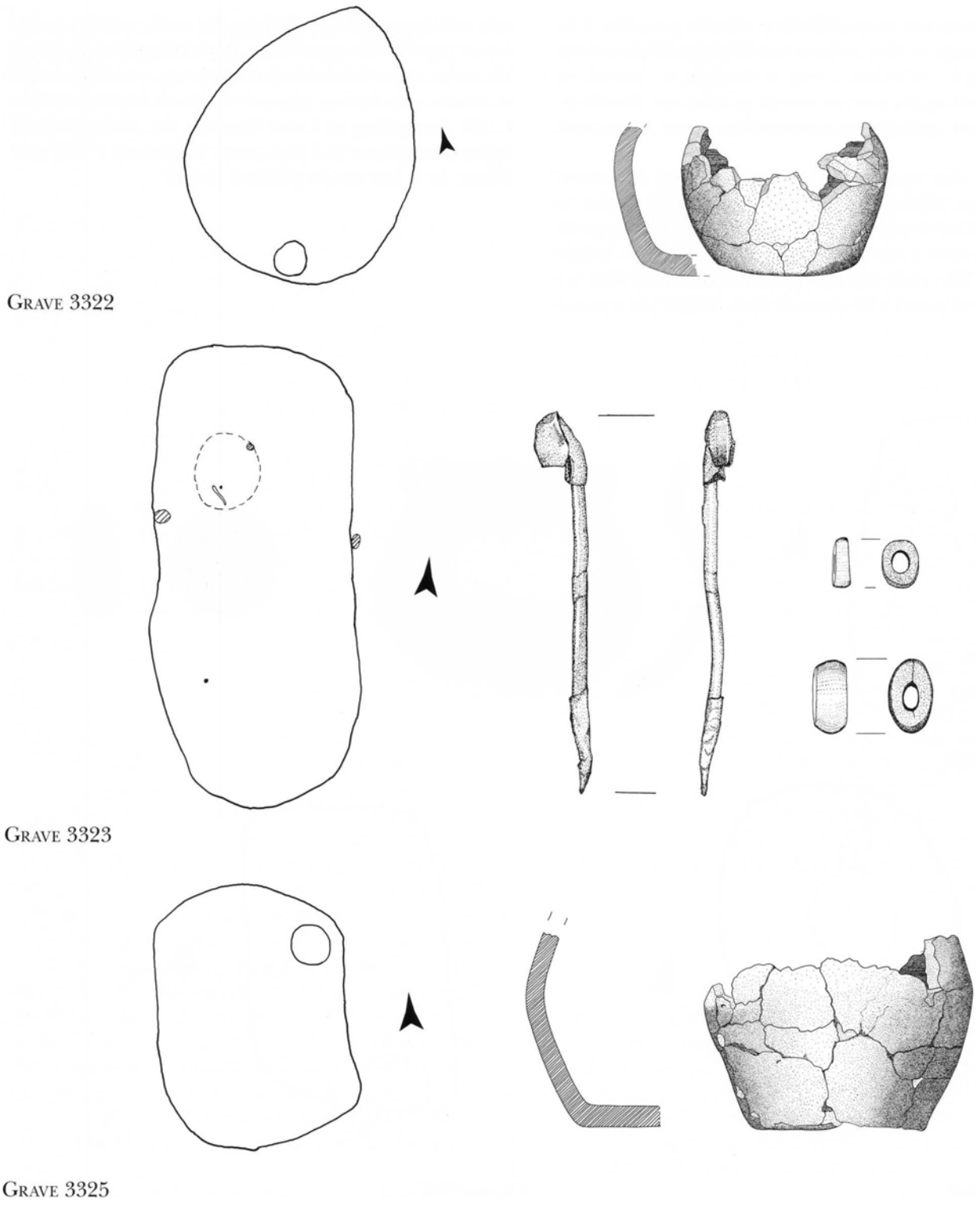
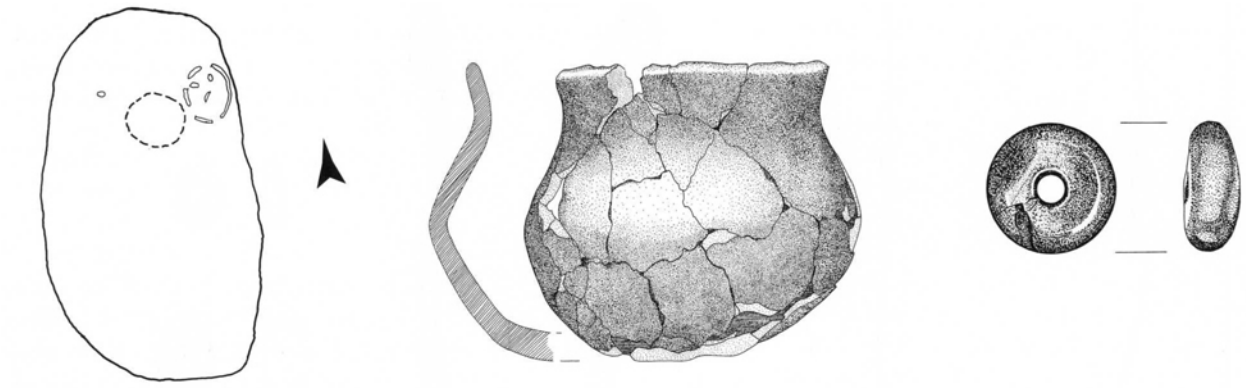


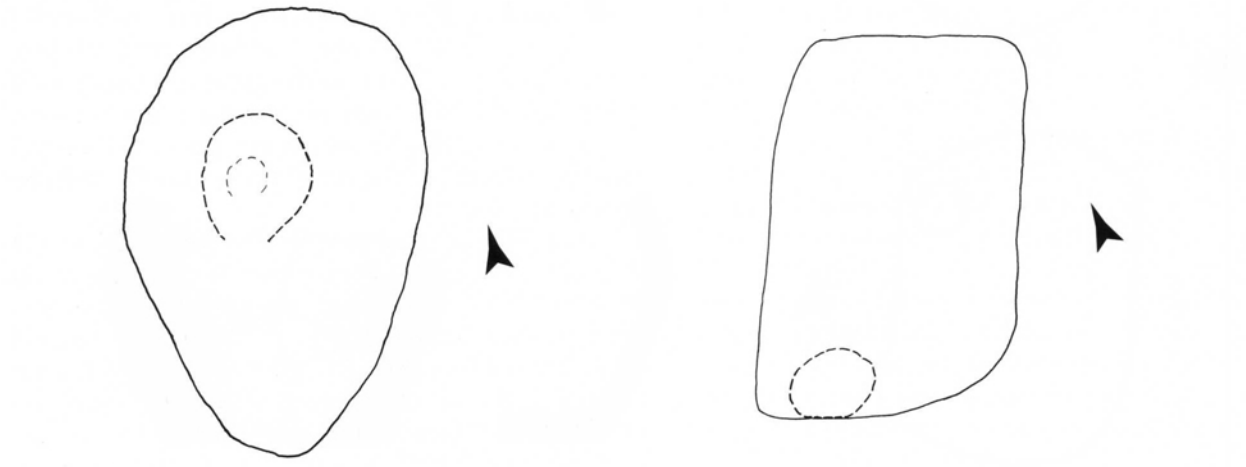
Fig. 2. Ground plan and grave inventory from graves 3322, 3323 and 3325. Graves 1:20, pottery 1:3, other artefacts 1:1. Drawn by L. Heidemann.

is that it uses the most objective criteria possible. The disadvantage is that it does not distinguish between, for example, whether a rim is straight or flared, or whether an upper part is convex or concave. Similarly, it does not include ornamentation as an important element.

There are some problems with fitting the vessel from grave 3326 into Lund Hansen's typology due to the vessel's deformation, but it is presumably a type IV 2c vessel with a normal rim and belonging to height group 1. The code means that it is a relatively slim tri-segmented vessel with normal neck height but a relatively tall upper part, including the neck, relative to the lower part[2]. The type is the most abundant in Lund Hansen's material and is, furthermore, one of the most characteristic for her phase 2+3, which corresponds to C1b2. According to Lund Hansen, the characteristic types from phase 2+3 also occur in phase 3 (=C2) and phase 3+4, but not in phase 4 (=C3).



Grave 3326



Grave 3330

Grave 3347

Fig. 3. Ground plan and grave inventory from graves 3326, 3330 and 3347. Graves 1:20, pottery 1:3, bead 1:1. Drawn by L. Heidemann.

GRAVE 3330

The grave was oval in plan, c. 118 x 80 cm, with sloping sides and a base, which sloped down towards the west. It extended to a maximum of 14 cm below the surface of the subsoil. There were no grave goods, but tooth enamel was found approximately in the centre of the northern end of the grave under a dark patch (Fig. 3).

GRAVE 3342

The grave was rectangular in plan, 163 x 79 cm, with both a vertical and a sloping long side and a flat base. It extended 9 cm below the surface of the subsoil. No traces of a coffin could be seen, but the section showed that the fill consisted of grey-brown clay mixed with topsoil, which at the sides and the base was separated from the subsoil by a layer of lighter brown clay containing small bodies of topsoil. This thin lighter layer presumably represents the fill around a coffin, now represented by the darker layer with a greater content of topsoil. In the northeastern end of the grave was a vessel from which the rim and belly had been removed by ploughing or during removal of topsoil. In the vicinity of the vessel lay two amber beads, two yellow, two blue and two red-brown glass beads and an iron fibula. Two of the beads were fragmented and are therefore not included on figure 4. In addition to the artefacts there was a tooth (molar) from a 4-5 year old child[3].

Fibula: The fibula is of Haraldsted type, a type that was recognised by Norling-Christensen (1957, 38ff.) and further defined by Stig Jensen (1980, 192 note 19). The fibula is so corroded that it is not possible to see whether it is ornamented. It has a crossbow construction, ribbon-shaped bow with a narrow pointed foot and turned-in catch-plate (=fixed pin sheath). The spiral axis appears, according to an X-ray photo, to rest in a tube-shaped bedding formed by one end of the bow, as is usually the case with this type. Part of the pin is missing. The fibula is 4.9 cm long and 0.8 cm broad. The type clearly belongs in a Late Roman Iron Age C3 context and, accordingly, it dates grave 3342 to C3.

Vessel: Remaining height: 7.9 cm. Diameter at base: 8.5 cm. Ware thickness: 0.9-1.2 cm. Yellow-brown surface, coarse ware. The vessel is so deformed that no comments can be made on its form (Fig. 4).

GRAVE 3347

The grave was almost rectangular in plan, 97 x 64 cm, with straight sides and a flat base. It extended 16 cm below the surface of the subsoil. The grave contained no grave goods (Fig. 3).

GRAVE 3368

The grave was almost rectangular in plan. The original burial covered an area of c. 340 x 230 cm. The outermost part was filled with light grey sandy clay slightly mixed with topsoil and flecked with ochre-coloured clay to a depth of 15-20 cm below the surface of the subsoil. Here the grave had straight sides and a flat base, which sloped down towards the centre and formed a deepened, rounded bedding, presumably for a log coffin. At the centre of the grave (over its deepest part), a darker rectangle measuring c. 250 x 84 cm could be seen (Fig. 5). At the surface of the subsoil the fill comprised dark grey, slightly ochre-flecked clay mixed with topsoil.

About 37 cm below the surface of the subsoil, within the dark rectangle, a dark brown greasy layer could be seen. This is interpreted as an organic mixture of fat from the corpse and the decomposed remains of clothes and hides. The lower boundary of this layer consisted of a black dissolved charcoal layer representing the remains of the base of the coffin. At the southwestern end of the grave, about 10 cm over the base, there were clear traces of the side of the coffin in the form of a narrow band of charcoal. The charcoal presumably originates from surface charring of the coffin during its fabrication. The base of the coffin had been 225 cm long and 60 cm broad and the grave itself

[2] Ulla Lund Hansen considers her type IV vessels as quadri-segmented, but in this article they are called tri-segmented, as they comprise a lower part, an upper part (= shoulder, according to Ulla Lund Hansen) and a neck/rim.

[3] Dentist Åse Hansen, who has determined its age and established that it is only slightly worn, examined the tooth. It is healthy, without evidence of caries.

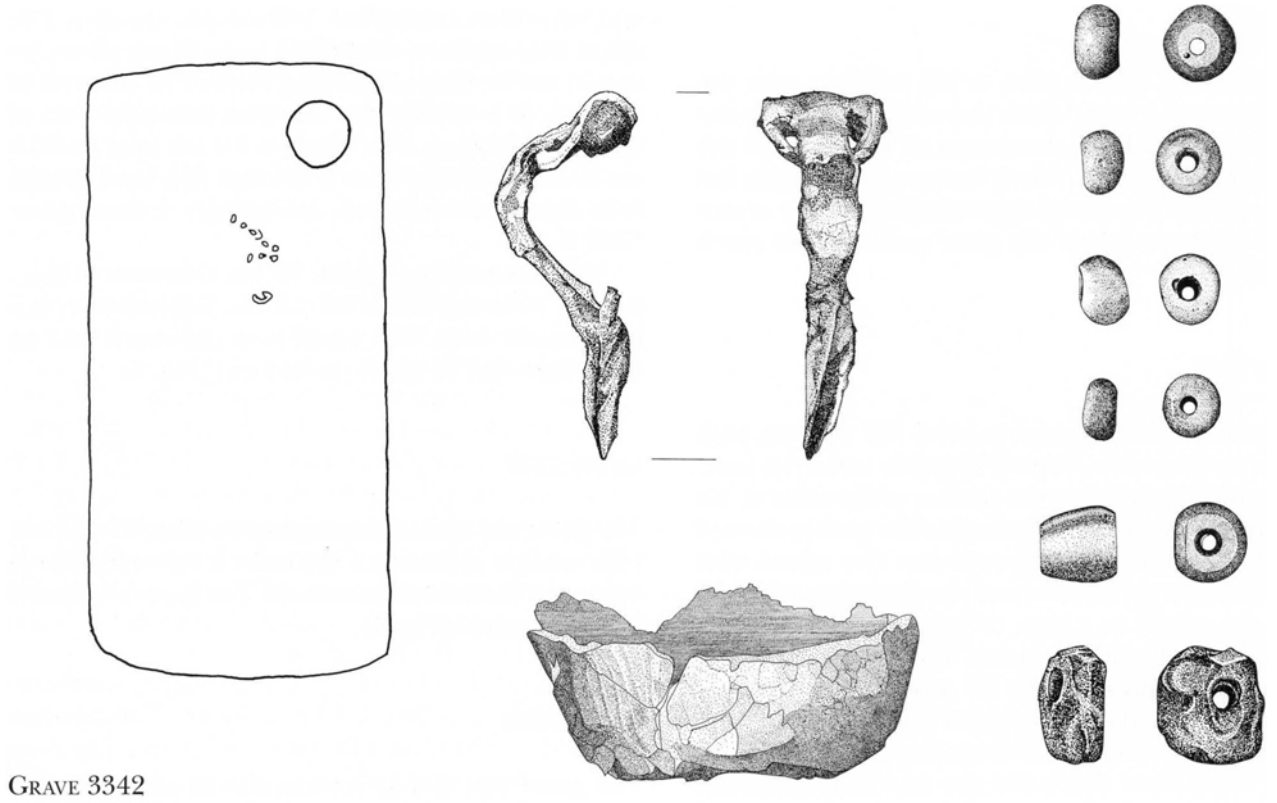


Fig. 4. Ground plan and grave inventory from grave 3342. Grave 1:20, pottery 1:3, other artefacts 1:1. Drawn by L. Heidemann.

extended 45 cm below the surface of the subsoil.

A drain on the eastern side had disturbed the coffin. At its base, the drain had barely touched the coffin, but at the surface of the subsoil perhaps 10 cm or more of the dark fill on the eastern side had been cut away. A small piece of thin bronze was found at the surface of the drain. This could originate from grave goods, which were disturbed when the drain was dug. High up in the drain fill a fragment of an iron knife was found which presumably also originates from the grave. At the southern end of the outer part of the burial there was clear evidence of modern disturbance, which also continued beyond the limit of the grave towards the south. This is shown as patches on the plan of the grave (Fig. 1). The digging of the drain probably meant that the excavators struck an artefact with bronze on the southeastern side of the grave, perhaps a wooden bucket with bronze bands. A little to the south of the artefacts described below, there was a modern disturbance at the southeastern side of the grave, but this did not touch the base of the coffin. The find presumably encouraged the diggers to carry out a robber excavation at the southern end of the grave. They probably did not find anything as they were outside the limits of the grave and they did not continue their plundering in the northern end of the grave, which was undisturbed and contained the artefacts described below.

In the grave, just north of the centre, a well-preserved set of teeth from a 25-year old woman was found[4]. The skeleton was not preserved, but the position of the dress jewellery relative to the teeth, indicates that the woman had lain flexed with her head to the north and looking to the east. Her position resulted in the dress jewellery lying in several overlapping layers within a belt running from the set of teeth diagonally down to the southeastern side of the coffin. The original position of the artefacts on the woman has been inter-

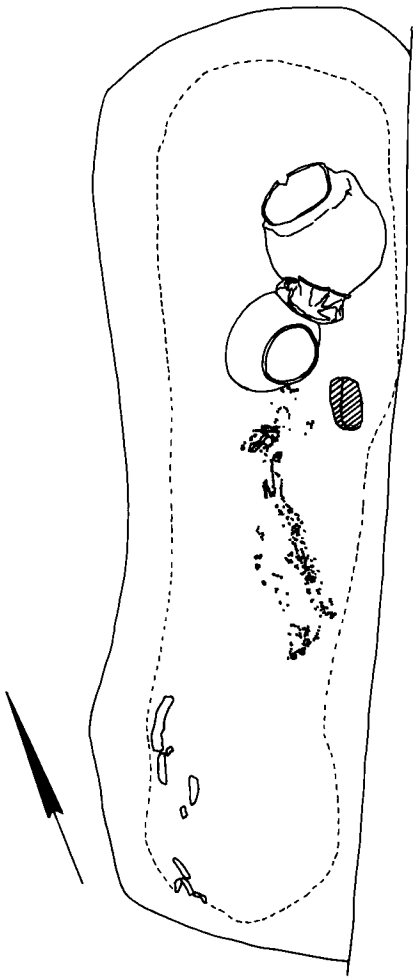


Fig. 5. Detailed plan of the female grave (grave 3368). Only the central part of the grave itself is shown, not the whole of the burial. 1:20. Drawn by K.F. Paulmann.

preted to the best of the author's abilities. Extending across the whole belt of artefacts lay several rows of beads and a very small amount of thread. These are interpreted as the remains of three strings of beads comprising a total of 482 beads. Most were of glass or amber, but there were also three silver foil beads. The smallest of the strings of beads also included a Roman silver coin, fitted with a loop, and a bi-conical pendant. Close to the teeth lay a sheet silver fibula, and about 10 cm further to the south lay a ribbon-shaped silver sheet fibula. Among the beads there were five sets of silver hooks and eyes. East of the teeth lay the upper stone from a saddle quern; to the north stood three clay vessels. In the southernmost vessel (vessel 3) there was a small clay cup and a Roman glass. The northernmost vessel (vessel 4) contained the jawbone of a sheep or goat.

Sheet silver fibula: (Fig. 6) The fibula is made of silver with partial gilding. It comprises a rectangular headplate, a ribbon-shaped bow and a roof-shaped rhomboid footplate with slightly concave sides. At the transition from bow to footplate, a small circular disc has been mounted on either side. Along each short side of the headplate there have been four facetted knobs and along the long sides, opposite the bow, there were seven of these knobs. Out of a total of 15 knobs, 11 complete examples and a couple of fragments are preserved. Six spiral-like rods had been attached to the reverse of the headplate. These were arranged in pairs, joined by way of a small catch through a small vertical central plate with three holes. Parts of the actual spiral are present as small fragments, while the pin catch and pin are missing.

The fibula is 9.7 cm long. The headplate measures 4.5 x 2.4 cm. The bow is 1.15 cm broad. The distance between the head and footplate is 2.4 cm. The footplate is 4.6 cm long and 3.2 cm broad.

The fibula is decorated with eight different punchmarks (Fig. 7). On the headplate there are punchmarks 1-7. It is divided up into four fields by way of the punched decoration. The two triangles at the short sides are gilded. The bow is ornamented with punchmark no. 5, and is gilded. It terminates at each end with one broad and two narrow beaded wires. The footplate is ornamented with punchmarks 1-2 and 4-8. It is gilded over most of its surface, but a broad elongated V-shape delimited with the aid of the punched decoration around the "ridge" is free of gilding. The punchmarks are of types of which

[4] Dentists Åse Hansen and Verner Alexandersen have examined and determined the ages of the teeth. In all, 31 teeth were found. Accordingly, only the wisdom tooth at the left side of the upper jaw is missing. The teeth are healthy, without caries. They are worn to a degree. The size of the teeth is closer to those of women than of men, although the size is not expressly feminine. Taking into account the nature of the grave goods, this must be the grave of a woman.

Fig. 6. The sheet silver fibula from the female grave 3368. Scale 1:1. Photo by J. Weng.

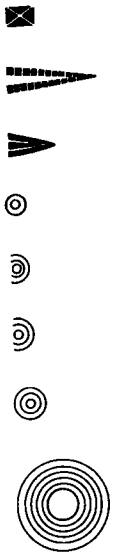


Fig. 7. Punchmarks on the sheet silver fibula from grave 3368. 4:1. Drawn by K.F. Paulmann.

some occur as early as the 3rd century AD, while others first become common in the 4th century and continue in use up into the Early Germanic Iron Age (Hansen 1970, 86ff.). Ulla Lund Hansen has shown that the sheet silver fibulae from the Early Germanic Iron Age are characterised by animal heads in profile at the transition from the bow to the footplate. Sheet silver fibulae from the Late Roman Iron Age C3 have, on the contrary, no animal heads in profile (Hansen 1970, 82ff.). According to this classification, the fibula from Torstorp Vesterby belongs to the Late Roman Iron Age C3. In Ulla Lund Hansen's summary of the punchmark types on sheet silver fibulae there are only examples of fibulae with a maximum of four different punchmarks in the group without heads in profile, while the fibulae with heads in profile are characterised by a large number of punchmarks. The Torstorp Vesterby fibula shows that at least seven different punchmark types can appear within the group lacking heads in profile[5]. Perhaps this is an indication that the fibula was produced late in C3 at the transition to the Early Germanic Iron Age.

Ribbon-shaped fibula: Large part of a ribbon-shaped fibula (Fig. 8). This is 5.35 cm long and 1.1 cm broad. The fibula is made of bronze with a 0.35 cm broad gilded band of silver foil on the obverse. This is bordered on each side by two silver-beaded wires in between which there is a narrow, hammered silver ribbon, woven from two pairs of wires. The fibula has had a turned-in pin catch, of which only a little is preserved. None of the spiral construction or the pin is present. The terminal at the head end of the fibula is also missing. The gilt ribbon seems to have its original full length. It is ornamented with a series of dots along the central axis and a row of cross-hatched punched triangles along the sides (Fig. 9). Lowermost on the bow, just before the foot, there are two cross-hatched punched rhombes. The punched decoration is present on the foot and on the bow, whereas the short section

[5] According to Ulla Lund Hansen's figure 14 (Hansen 1970, 81) different sizes of the same type of punchmark as punchmarks nos. 5 and 6 on the Torstorp Vesterby fibula have not been included. They are therefore only counted as one type of punchmark in comparison with her summary of the punchmarks on the sheet silver fibulae. Therefore, the basis for comparison is seven, and not eight, types of punchmark.

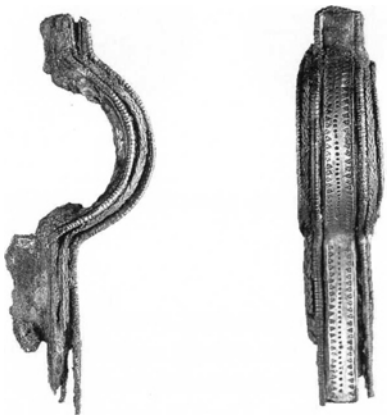


Fig. 8. The ribbon-shaped fibula from the female grave 3368 seen from above and from the side. 1:1. Photo by J. Weng.

Fig. 9. Punchmarks on the ribbon-shaped fibula from grave 3368. 4:1. Drawn by K.F. Paulmann.

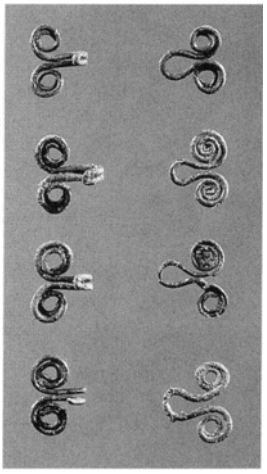


Fig. 10. Hooks and eyes from grave 3368. 1:1. Photo by J. Weng.

just before the terminal at the head is unornamented. Two unattached beaded wires have presumably been located on each side of the bow.

The fibula has no immediate parallels. The fact that the terminal at the head end is missing does not make comparisons with other fibulae easier. Typologically it appears to be related to the Nydam fibulae, which also can have a turned-in pin catch, even though these do not have an applied decorated silver band. The punch-decorated silver foil leads one's thoughts in the direction of the sheet silver fibulae, which date from the Late Roman Iron Age C3 and the Early Germanic Iron Age. Punched triangles and rhombes with cross-hatching are known as early as the 3rd century AD and continue in use up into the Early Germanic Iron Age (Hansen 1979, 90). On the basis of its form it seems obvious to date the fibula to the Late Roman Iron Age C3.

Hooks and eyes: There are five sets of silver hooks and eyes from grave 3368. The hooks are 1.1-1.25 cm broad (across the spirals) and 0.9-1 cm long. The eyes are 1.05-1.2 cm broad and 0.9-1 cm long. Four sets are almost complete (Fig. 10), whilst the fifth is very fragmented.

The hooks and eyes are of a type with coiled ends. The grave's context places the five sets unequivocally in the Late Roman Iron Age C3; whereas the hooks and eyes with coiled ends at the Hjemsted cemetery belong to the Early Germanic Iron Age. The dating of the type with coiled ends is therefore extended, from belonging exclusively to the Early Germanic Iron Age, as presumed so far (Ethelberg 1986, 44ff.), to also appearing in the later part of the Late Roman Iron Age. The type has thus a longer period of overlap with hooks and eyes of the pretzel-shaped type than previously assumed, as the latter also occur in the later part of the Late Roman Iron Age and the Early Germanic Iron Age.

The hooks and eyes from Torstorp Vesterby are approximately half the size of those from Hjemsted, which perhaps reflects the chronological difference, implicating that the small hooks and eyes with coiled ends belong to the Late Roman Iron Age and the large examples belong to the Early Germanic Iron Age.

Bi-conical pendant: The presumed bi-conical pendant from grave 3368 is made of sheet silver, on which the remains of gilding can be seen. It comprises a bi-conical piece of tube with a soldered-on domed base. It has a loose lid (Figs. 11-12). The piece is 1.7 cm in

Fig. 11. Bi-conical pendant from grave 3368, seen from below. 1:1. Photo by J. Weng.

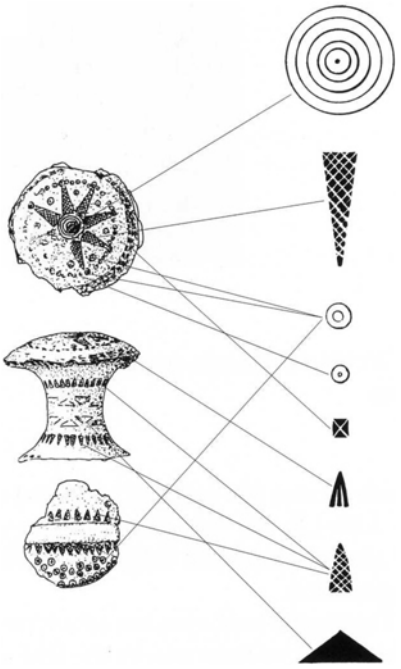


Fig. 12. The bi-conical pendant from grave 3368 with the types of punchmarks used. Pendant 1:1, punchmarks 4:1. Drawn by K.F. Paulmann.

height and 1.8 cm in diameter at its broadest point, at the transition from tube to base. It is most probably a bi-conical pendant of the type defined by Nielsen (1997, 23ff.). On the piece from Torstorp Vesterby the suspension mechanism is missing. This would comprise two loops uppermost on the tube and a tube on the lid, through which a string would be passed to hold the lid closed (Nielsen 1997, 25 Fig. 4). The piece is richly ornamented with punched decoration on all the available surfaces. Only on the lid is there an unornamented zone where the tube is presumed to have been.

The punched decoration was produced using eight different punchmarks. Three of these are of the same type as nos. 1, 3 and 4 on the sheet silver fibula. As was the case with the sheet silver fibula, some of the

Fig. 13. Roman *siliqua* from grave 3368, obverse and reverse. 1:1. Photo by J. Weng.

punchmarks on the pendant occur already from the 3rd century, while the others appear first in the 4th century. The bi-conical pendant is dated, as a type, to the Late Roman Iron Age C3 and the Early Germanic Iron Age (Nielsen 1997, 25f.). The example from Torstorp Vesterby must therefore, on account of its context, be placed in C3.

Roman siliqua: The silver coin from grave 3368 is approximately 1.9 cm in diameter (Fig. 13). It has been identified by Anne Kromann as a *siliqua* struck under Constantinus II in Nicomedia within the period 340-51 AD (Kromann 1995, 350 Fig. 13.4 no. 59). In Denmark, Roman *siliquae* from the 4th century have been found both in a hoard deposited in the Late Roman Iron Age and in hoards deposited in the Early Germanic Iron Age, i.e. the circulation period of the coins varies. The hoards from the Early Germanic Iron Age are the two hack silver hoards from Høstentorp and Simmersted. It is characteristic of the coins in these hoards that they have a later composition and are more worn than the *siliqua* hoard from Gudme III, which is thought to have been deposited in the 4th century (Kromann 1988; Fonnesbech-Sandberg 1989, 424ff.; Fonnesbech-Sandberg 1990, 77f, 83f.). There were probably two chronologically distinct streams of imports, and the coin from Torstorp Vesterby must, on account on the context of the grave, belong to the earlier of these.

The coin is very corroded over certain parts of its surface. The face of the Emperor is thus unclear, whereas the letters and decoration, particularly on the reverse, are very distinct. It seems, therefore, that the incomplete preservation of the surface is more due to corrosion than to wear.

The loop is ribbon-shaped, without decoration, and about 0.35 cm broad. The fact that the coin has been fitted with a loop shows, naturally, that is was as an ornament, as part of a set of jewellery that the coin was offered in the grave. It had lost its original

function as a method of payment and was instead used as an amulet or a status symbol. It is unlikely that *siliquae* were ever used as coins in Denmark but rather as amulets and crude metal (Fonnesbech-Sandberg 1989, 448ff.; Fonnesbech-Sandberg 1990, 83f.). The *siliqua* from Torstorp Vesterby cannot have been used for very many years before it was buried together with the woman.

Beads: The beads from grave 3368 give a very homo-

Fig. 14. The strings of beads from grave 3368. No scale. Photo by J. Weng.

geneous impression (Fig. 14). The strings of beads are kept predominantly in red-brown and yellow. The glass beads are very uniform in size. Apart from a small number of exceptions, they all lie within Ethelberg's medium-sized category, i.e. between 0.55 and 1.0 cm in diameter (Ethelberg 2000, 77ff.). The few that are smaller comprise two light blue beads and a dark blue facetted bead as well as all the gold foil beads. All in all, there are seven beads, which are smaller than the majority, while a white bi-conical and a white disc-shaped bead are a little larger. The amber beads vary a little more in size, but not so that this is noticeable in the strings, apart from the long string of amber beads in which the large beads have been gathered at the centre[6].

The largest string of beads comprises exclusively glass beads. With a single exception, the beads are red-brown and yellow (including gold). The exception is the black glass bead, which was placed at the centre. The beads are arranged in a coloured linear pattern, but they are not placed quite symmetrically.

The large amber string of beads is built up around the heavy central beads. This gives a very uniform and symmetrical impression regardless of whether the sequence is broken at the back of the neck by two pairs of blue beads or not.

The small string of beads is the most diverse as, in addition to amber beads, it contains glass beads distributed along its length, as well as the silver coin and the bi-conical pendant. The silver foil beads also belong to this string, but they can no longer be inserted in it due to their fragmentation and poor state of preservation.

During the excavation it could not be determined whether the strings of beads were joined at the back of the neck or whether they had hung from a fibula

[6] The strings of beads from the female grave have been reconstructed as correctly as possible. There is no doubt that there are three strings. Similarly, it is beyond question that the longest example comprised purely glass beads and that the next longest comprises amber beads with the largest beads at the centre. On the other hand, there is some doubt as to whether the glass beads in this string perhaps belonged instead to the small string. Furthermore, there is some doubt with regard to the pattern sequence and the exact location of the beads, particularly at the neck, as the beads here, due to the woman's position and the collapse of the grave in the course of time, lie over one another. Some of the beads have not been positioned in the strings, either because they are fragmented or because it could not, on the basis of their location, be determined into which of the three strings of beads they should be fitted in. This applies, for example, to the six yellow beads, which must be presumed to belong with the glass beads, as it is only here that yellow beads are found, but their position cannot be determined.

on each shoulder[7].

The beads from the small graves are of the same type and colour as those in the female grave. The glass beads all fall within the medium range, just like the majority of those in the latter. The only example is a green glass bead, which was not found in the female grave, but in grave 3323. Its size and form are, however, the same as the other glass beads.

As Per Ethelberg has pointed out, it is difficult to use beads in chronological studies, especially with regard to high-resolution chronologies (Ethelberg 2000, 77ff.). The beads from the female grave are dated by their context to the Late Roman Iron Age C3, and the same applies to the beads from grave 3342.

In 1976 Ulla Lund Hansen produced a summary of beads in grave finds from the Late Roman Iron Age on Zealand (Hansen 1976, 150f.). From this it is apparent that the number of beads in individual graves increases in the course of the period, from an average of four beads per grave in the early part of the Late Roman Iron Age to an average of 390 in C3 (Hansen 1976, 151 Fig. 66). The female grave from Torstorp Vesterby fits in well with this picture with its 482 beads. Ulla Lund Hansen's summary shows, furthermore, that there are almost equal numbers of glass and amber beads in the graves and very few metal beads. This also corresponds well with the female grave, in which there are 238 amber beads, 241 glass beads and three sheet silver fibulae. Grave 3342 with its eight beads is not at all comparable with the other graves from C3, but this is of course a child's grave.

The glass beads found in Denmark from the Late Roman Iron Age have previously been seen as imports from the Roman Empire. However, the latest evidence concerning glass bead production at Lundeborg as early as the Late Roman Iron Age[8] opens up the possibility that the beads could have been produced in Lundeborg or even locally in Høje-Taastrup. So far, there is no firm evidence for the latter.

Knife: The fragment of the iron knife from grave 3368 is 4.8 cm long, 1.5 cm broad and 0.5 cm thick at the back of the blade. The knife is single-edged and it is the outermost part of the blade, which has been found. The outermost tip is missing. Taking into consideration the thickness relative to the breadth, the knife had probably been sharpened many times.

Iron knives appear rarely as grave goods in graves from the Late Roman Iron Age on Zealand. They have only been found in 3-4% of the graves, in contrast to the Iron Age graves from Funen and Jutland where knives are among the most common grave goods (Ethelberg 2000, 113ff.).

Roman glass: The glass from grave 3368 lies in a plaster cast in its original form, but it is in very poor condition. The glass is flattened and the rim appears to be missing. The diameter of the top and base cannot be measured. The present height is about 13 cm. It is possible, despite its state of preservation, to see that it is a Late Roman conical glass beaker of the same type as the two from Högom (Hansen 1987, 119 Fig. 68; Ramquist 1992, 127f, 138f, plate 88-89). It is not possible to determine whether it is oval-cut or facetted.

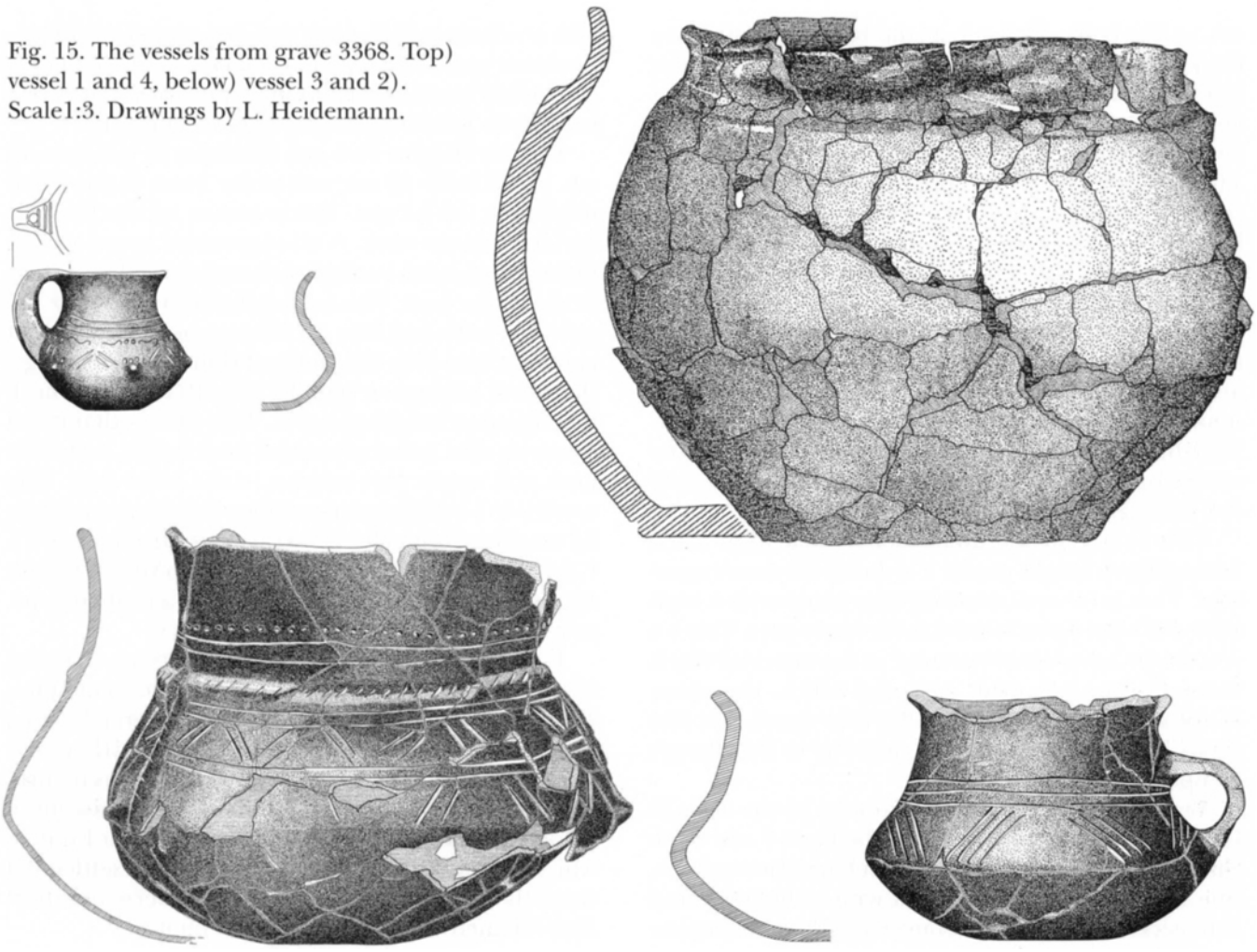
Per Ramquist mentions that the type is thought to have been produced through the 4th and into the 5th centuries AD. The chambered tomb in mound 2 at Högom is dated to the Early Germanic Iron Age, c. 500 AD, but the glasses could have been deposited perhaps 100 years after they had been produced, like many other artefacts in this grave (Ramquist 1992, 138f.). Fragments of the same type of glass are known from Eketorp from the later part of the Late Roman Iron Age (Näsman 1984, 57f.). The glass from Torstorp Vesterby gives us yet another piece of evidence for the existence of this type in the Late Roman Iron Age, as the sheet silver fibula dates the grave to C3. Glass of this type was produced in the Cernajchov culture in Southeastern Europe close to the Black Sea and represents a Syrian-Egyptian tradition (Näsman 1984, 29; Straume 1987, 62).

Vessel 1: Height: 5.7 cm. Diameter at the rim: 4.9 cm, at the belly: 6.2 cm, and at the base: 2.5 cm. Ware thickness: 0.25-3 cm. Black-brown burnished surface, fine ware. A tri-segmented little cup with a handle (Fig. 15). The rim is flared and continues into a curved neck. This continues into a conical upper part, which *via* a sharp belly break continues into a lightly curved lower part. Very slightly curved base. The facetted handle runs out from the rim and is attached at the lower part. The handle is decorated uppermost with three horizontal lines. At the transition from neck to belly the cup is decorated with three narrow encircling grooves, which are broken by the handle. On the

[7] An illustration of the reconstructed dress can be found in Fonnesbech-Sandberg *et al.* 1999, 41.

[8] Personal comm. museum curator P.O. Thomsen, Svendborg Museum.

Fig. 15. The vessels from grave 3368. Top) vessel 1 and 4, below) vessel 3 and 2). Scale1:3. Drawings by L. Heidemann.



belly break there are five evenly spaced small bosses. Between these, on the upper part, there are two pairs of narrow grooves angled obliquely. Over the tip of each angle, at each side, there is a groove in the form of a crescent. Immediately over each boss there are three small circular dots, and higher up, on level with the crescents, and over the three bosses furthest away from the handle there are two small circular dots. On both sides of the handle, on the upper part of the cup, two narrow vertical grooves have been engraved, and above these three small circular dots.

According to Lund Hansen's typology this is a type IV 1d vessel with a high neck belonging to height group 1. The code shows that it is a very slim vessel with a high upper part and neck relative to the lower part. The type cannot, due to the lack of dated find combinations, be placed chronologically by Lund Hansen (Hansen 1976, 115).

By way of a comparison with Southern Jutish material, which should not really be carried out before there is an independent typology for the vessel types on Zealand from C3 and Early Germanic Iron Age, it can, however, be seen that the cup belongs to Ethelberg's composition group III, which is found in the Late Roman Iron Age C3, and continues into the Early Germanic Iron Age (Ethelberg 1990, 67ff.). The group comprises vessels with neck decoration and continuous decoration on the upper part. This dating must be said to be consistent with the grave's position in C3.

Vessel 2: Height: 10.4 cm. Diameter at the rim: 10

cm, at the belly: 13.3 cm, at the base c. 5 cm. Ware thickness: 0.4-0.5 cm. Black-brown burnished surface, fine ware. A tri-segmented handled vessel with flared rim and conical neck, which, by way of a small break, runs over in the conical/slightly, curved upper part. The transition from the upper to the lower part is strongly curved and tends towards a proper belly break. The lower part is slightly curved and continues over into a flat base. The broad ribbon-shaped handle is attached to the neck and to the belly break respectively (Fig. 15). The vessel is ornamented lowermost on the neck with three narrow encircling grooves, which are broken under the handle. Below these, on the upper part, there are bundles of lines angled obliquely. Each bundle comprises four narrow grooves, with the exception of the one closest to the handle, which only has three grooves.

This is a type IV 2d vessel with a high neck belonging to height group 1 in Lund Hansen's typology. That is to say a relatively slim vessel with a high neck and upper part relative to the lower part. This is a vessel type, which is not present in the material which Lund Hansen has dealt with and which, therefore, is not assigned chronologically. This vessel, just like vessel 1 from the same grave, belongs to Ethelberg's composition group III.

Vessel 3: Height: 17.7 cm. Diameter at the rim: 16 cm, at the belly: 22.5 cm, and at the base: 7 cm. Ware thickness: 0.2-0.5 cm. Black-brown burnished surface, fine ware. A tri-segmented pot with a slightly flared rim/neck, which continues into a slightly curved upper part. *Via* a sharp belly break the slightly curved lower part is led towards the slightly curved base (Fig. 15). The vessel is decorated on the neck with an encircling row of small circular impressions. Below this there are two encircling narrow grooves. A horizontal encircling bead with oblique impressions is placed at the transition to the upper part. From this there is in three places a vertical bead with oblique impressions, which run down over the upper part and terminate at the belly break. Here there is a small boss located on each side of the vertical beads. Between the vertical beads there is a patterned border comprising, uppermost, two horizontal narrow grooves and, below this, an angled pattern comprising two opposing pairs of oblique grooves. The patterned border is repeated at the belly break.

The vessel is a type IV 1c vessel with a high neck, and as it is taller than 12 cm it belongs to Lund Hansen's height group 2. According to the code it is a slim vessel with a relatively high neck and upper part relative to the lower part. The type has not been assigned chronologically into Lund Hansen's type series. This vessel belongs to Ethelberg's composition group III.

Vessel 4: Height: 21.6 cm. Diameter at the rim: 22 cm, at the belly: 27 cm, and at the base: 14 cm. Ware thickness: 0.6-1.2 cm. Yellow-brown to black-brown surface, coarse ware. A tri-segmented vessel with a slightly flared rim, conical neck and marked transition to the upper part. This is rounded and runs over the rounded belly and into an almost conical lower part and a flat base (Fig. 15). In Lund Hansen's chronology, the vessel belongs to type IV 2a with a normal neck belonging to height group 2. This means that it is a relatively slim vessel of normal neck height and a low neck and upper part relative to the lower part. The vessel is in Lund Hansen's combination diagram figure 34 combined with characteristic types from phase 2 = C1b1 (Hansen 1976, 118). The Torstorp Vesterby grave shows, however, that it must have been a resilient type, as it is also present in C3.

If the vessel is compared to Albrectsen's material from Funen it can be seen that it has almost an intermediary position between his forms 42 and 43 from the Late Roman Iron Age periods I and III respectively. It has, however, a marked neck break as in form 40 (Albrectsen 1968, 249) and is also reminiscent of an ornamented vessel from Præstestien, near Esbjerg, which belongs to the oldest phase of the settlement from the 4th century and the Early Germanic Iron Age (Siemen 1989, 88ff and cover photo).

The pottery from the graves

As is apparent from the use of Lund Hansen's typology on the intact vessels from Torstorp Vesterby, three of the vessels from grave 3368 belong to types, which are not assigned to her chronological phases. These phases are defined by different characteristic types, and in contrast to the early phases of the Late Roman Iron Age, no pottery types are included in her phase 4 = C3. This is due to a lack of suitable find assemblages from this period in the material used, which in particular appears to contain pottery from the early phases. Accordingly, it is an obvious thought that the types IV 1c high neck, height 2, IV 1d high neck, height 1, and IV 2d high neck, height 1, which are vessels with a high neck and upper part relative to the lower part, are those which characterise C3 and

perhaps the Early Germanic Iron Age. They have, at least, been found together with a sheet silver fibula lacking heads in profile.

According to Lund Hansen's chronology, the vessel from grave 3326 cannot be later that phase 3+4, i.e. a transitional phase from C2 to C3. This would normally be interpreted such that this grave was constructed significantly earlier than grave 3368. It is also possible that the vessel was old when it was placed in the grave; otherwise this grave is the exception that proves the rule that the type is not found in C3. Accordingly, vessel 4 type IV 2a normal neck, height 2, is apparently found in C1 b1, but also in C3.

Out of a total of eight vessels from the cemetery, four were found singly – each in its own small grave, while the remaining four lay in the female grave. The vessels from the small graves are clearly different from the set in the female grave. The former are unornamented, relatively thick-walled and of a coarse ware, whereas the three small vessels from the female grave are ornamented, thin-walled, burnished and of a fine ware. Only the fourth vessel in the female grave is comparable with the vessels from the small graves in terms of thickness and the nature of the ware. It is also unornamented but is, however, much larger. It is obvious to perceive the three fine vessels from the female grave as belonging together as a definite set, whereas the unornamented domestic vessel from the same grave seems to be a chance inclusion on that particular occasion. Finer vessels were clearly offered in the large grave than in the small graves.

Conclusion

Only two of the graves can be dated precisely, i.e. the female grave and grave 3342, which both belong to the Late Roman Iron Age C3. The sheet silver fibula in the female grave suggests, due to the many different types of punchmarks, that the grave should be dated late in C3. Despite the vessel in grave 3326, it is very likely that this is a cemetery, which was in use for a short time, such that the six other graves also belong to C3.

The site's longest, deepest and richest grave contained, as already mentioned, a 25-year-old woman. It is obvious to perceive all the seven lesser graves as child graves.

The five small graves were even more sparsely equipped than the two graves of medium length. They were either without finds (two examples) or contained a single vessel (two examples) or a vessel and an amber bead. The two medium-sized graves, in contrast, contained three and 10 artefacts respectively. As the longest of these graves (grave 3342: 163 cm in length) was also the most richly equipped, there is probably a relationship between age and the length of the grave and the content of grave goods. That is to say, status is achieved with age. As the longest of the graves of medium length contained a 4-5 year old child, the next longest grave (grave 3323: 147 cm in length) could have contained a smaller child, perhaps 3-4 years old, and the five smaller graves yet younger children and babies.

The fact that the relationship between the length of the grave, age and grave goods is not total within the child group is shown by grave 3330. This is the third longest of the children's graves, but contains no grave goods. The tooth enamel shows that this was not a newborn baby. This suggests that it was of no great consequence if a grave was 30 cm shorter or longer within the child group, where the graves ranged from 88 to 118 cm in length.

In the light of the fact that there probably are seven child graves and only one adult grave, it is very unlikely that the cemetery was in use for a long period of time. Why should several children be buried alone at a special cemetery, and then suddenly be accompanied by the burial of an adult female if not because the woman was their mother and they presumably all died within a short period. It is, therefore, obvious to perceive the eight graves as a family cemetery comprising a mother and her seven children.

The question is, however, whether they all died at the same time. Theoretically it is possible, if we presume that the woman was almost constantly pregnant. If we presume, furthermore, that age and amount of grave goods are linked and that the oldest child was 5 years old and the youngest a new-born, then the graves could on the basis of their contents be allocated by age as follows:

Grave 3347: no grave goods, 97 cm long = newborn baby?

Grave 3330: no grave goods, tooth enamel, 118 cm long = 9-month old baby?

Grave 3325: one article of grave goods, 88 cm long = 18-month old child?

Grave 3322: one article of grave goods, 91 cm long = 27-months old child?

Grave 3326: two articles of grave goods, 99 cm long = 3-year old child?

Grave 3323: three articles of grave goods, 147 cm long = 4-year old child?

Grave 3342: 10 articles of grave goods, one tooth, 163 cm long = 5-year old child

Grave 3368: at least 498 articles of grave goods, 31 teeth, 225-250 cm long = 25-year old adult female.

This is naturally a hypothesis. Another possibility is that the graves, due to their alignment, as mentioned, belong to two separate phases. The woman could still be the mother of all the children who, with regard to time of birth, need not be fitted into quite such a limited period of time as five years. It is, of course, also possible that the children had different mothers. The fact that there were no other adult graves at the site does, however, suggest that it was a one-off event or perhaps two episodes within a relatively short period of time. This was not an ancestral cemetery, which was used repeatedly over a long period of time. Perhaps it was an epidemic, which claimed its victims?

The female grave furnishings suggests a high class family with such a high position in society that it was natural to mark the deceased's (or the surviving husband's) status with a combination of Roman imports and domestic artefacts of a special quality. In addition to the metals, silver, bronze and gold, the glass and the coin were certainly imported. This is less certain with regard to the glass beads. They may have been imported from the Roman Empire – but perhaps more likely from Funen.

On the other hand, it is not unthinkable that the fibulae and the bi-conical pendant were produced locally. In any case, they were worn together as a set and they are all either made completely of sheet silver or have had silver foil applied, and also make use of punched ornamentation. 250 metres east of the cemetery a pit house has been excavated which contained the remains of a goldsmith's workshop (Fonnesbech-Sandberg 1999, 32f.). Pottery from the fill of the pit house has been TL-dated to 560 ±100 AD. The pottery could be contemporary with or later than the pit house. The latter presumably belonged to a farm, which is dated typologically to the 4th-5th centuries. The goldsmith's workshop belonged to the neighbouring farm to that which had the land on which the cemetery lay. The latter farm comprised at that time a well-built 30 m long main house and a 12.5 m long outhouse with perhaps a further outhouse all situated 150 m north of the cemetery. It was without doubt the fertile soil, which was the basis for the family's wealth.

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References

Albrectsen, E. 1968. *Fynske jernaldergrave III. Yngre romersk jernalder.* Fynske studier VII. Odense.

Ethelberg, P. 1986. *Hjemsted - en gravplads fra 4. og 5. årh. e. Kr.* Skrifter fra Museumsrådet for Sønderjyllands Amt, 2.

Ethelberg, P. 1990. *Hjemsted 2 - tre gravpladser fra 3. og 4. årh. e.Kr.* Skrifter fra Museumsrådet for Sønderjyllands Amt, 3.

Ethelberg, P. *et alii* 2000. *Skovgårde. Ein Bestattungsplatz mit reichen Frauengräbern des 3.Jhs.n.Chr. auf Seeland.* Nordiske Fortidsminder, Serie B bd. 19.

Fonnesbech-Sandberg, E. 1989. Münzfunktionen in der Kaiserzeit und Völkerwanderungszeit Dänemarks. *Frühmittelalterliche Studien* 23, pp. 420-452.

Fonnesbech-Sandberg, E. 1990. Anvendelsen af mønter i romersk og ældre germansk jernalder. In H. Thrane (ed.): *Gudme-rapport. Beretning fra det 3.Gudme-symposium, Hollufgård den 2.juni 1989.* Skrifter fra Historisk Institut, Odense Universitet nr. 38, pp. 75-87.

Fonnesbech-Sandberg, E. 1999. Landsby og enkeltgårde. In D.L. Mahler (ed.): *Høje-Taastrup før buerne. Glimt af 6000 års historie,* Københavns Amtsmuseumsråd og Høje-Taastrup Kommune, pp. 26-33.

Fonnesbech-Sandberg, E. and L. Boye 1999. Den rige jernalderbonde. In D.L. Mahler (ed.): *Høje-Taastrup før buerne. Glimt af 6000 års historie,* Københavns Amtsmuseumsråd og Høje-Taastrup Kommune, pp. 34-43.

Hansen, U. Lund 1970. Kvarmløsefundet - en analyse af sösdalastilen og dens forudsætninger. *Aarbøger for Nordisk Oldkyndighed og Historie* 1969, pp. 63-102.

Hansen, U. Lund 1976. Das Gräberfeld bei Harpelev, Seeland. *Acta Archaeologica* Vol. 47, pp. 91-158.

Hansen, U. Lund 1987. *Römischer Import im Norden. Warenaustausch zwischen dem Römischen Reich und dem freien Germanien.* Nordiske Fortidsminder, Serie B bd. 10.

Jensen, S. 1980. En nordjysk grav fra romersk jernalder. Sen romersk jernalders kronologi i Nordvesteuropa. *Kuml* 1979, pp. 167-198.

Kromann, A. 1988. A Forth Century *Siliqua* Hoard from Denmark. In *Rivista Italiana di Numismatica.*

Kromann, A. 1995. Die römischen Münzfunde von Seeland. In U.L.Hansen (ed.): *Himlingeøje - Seeland - Europa. Ein Gräberfeld der jüngeren römischen Kaiserzeit auf Seeland, seine Bedeutung und internationalen Beziehungen.* Nordiske Fortidsminder, Serie B bd. 13.

Näsman, U. 1984. *Glas och handel i senromersk tid och folkvandringstid. En studie kring glas från Eketorp II, Ôland, Sverige.* Archaeological Studies, Uppsala University. Institute of North-European Archaeology. AUN 5.

Nielsen, J.N. 1997. Dobbeltkoniske hængesmykker - og andre amuletter fra jernalderen. *Aarbøger for Nordisk Oldkyndighed og Historie* 1996, pp. 21-35

Norling-Christensen, H. 1957. Haraldstedgravpladsen og ældre germansk jærnalder i Danmark. *Aarbøger for Nordisk Oldkyndighed og Historie* 1956, pp. 14-143.

Ramquist, P.H. 1992. *Högom. The excavations 1949-1984.* Archaeology and Environment 13. University of Umeå.

Siemens, P. 1989. Husformer og randprofiler fra germansk jernalder og ældre vikingetid i Sydvestjylland. In *Bebyggelser og keramik fra 4.-9.århundrede.* Seminar på Esbjerg Museum 19.-20.marts 1987.

Straume, E. 1987. *Gläser mit Facettenschiff aus skandinavischen Gräbern des 4. und 5. Jahrhunderts n. Chr.* The institute for comparative research in human culture. Serie B, Skrifter 73.

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Radiocarbon dating of the iron production in slag-pit furnaces in Jutland

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ABSTRACT

Seventy-three samples of charred straw and charcoal from slag-pit furnaces on eleven different iron smelting sites in Jutland have been radiocarbon dated in order to investigate the duration of the use of the slag-pit furnace in iron production. At the following four major sites we have estimated the duration of iron production:

Drengsted	*AD 410-550*
Snorup	*AD 330-570*
Starup	*AD 140-340*
Gødsvang	*AD 300-550*

Taken as a whole we have dated the use of slag-pit furnaces in Jutland to approximately AD 250-610.

ARCHAEOLOGICAL DESCRIPTION

Iron Age iron production in Denmark is largely confined to south-western Jutland, although more than 100 iron production sites are known throughout the whole of Jutland (Voss 1993). The source of the iron ore is the abundant bog iron along the streams and lakes in Jutland. The charcoal was produced in large quantities in the surrounding forests.

When excavated, a well-preserved slag-pit generally contains a slag block weighing c. 200 kg. Each slag-pit is the result of the production of one batch of sponge iron, which was left at the bottom of the shaft of the furnace while the slag drained into the pit. The furnace itself was an almost cylindrical shaft built of half-dried clay bricks. The slag-pit under the furnace was filled with straw in order to prevent the charcoal from falling down into the pit. During the smelt, part of this straw sometimes became charred and this is the material which has been used for the radiocarbon dates in this study. We have radiocarbon dated samples from slag-pit furnaces from eleven different sites in Jutland (Fig. 1).

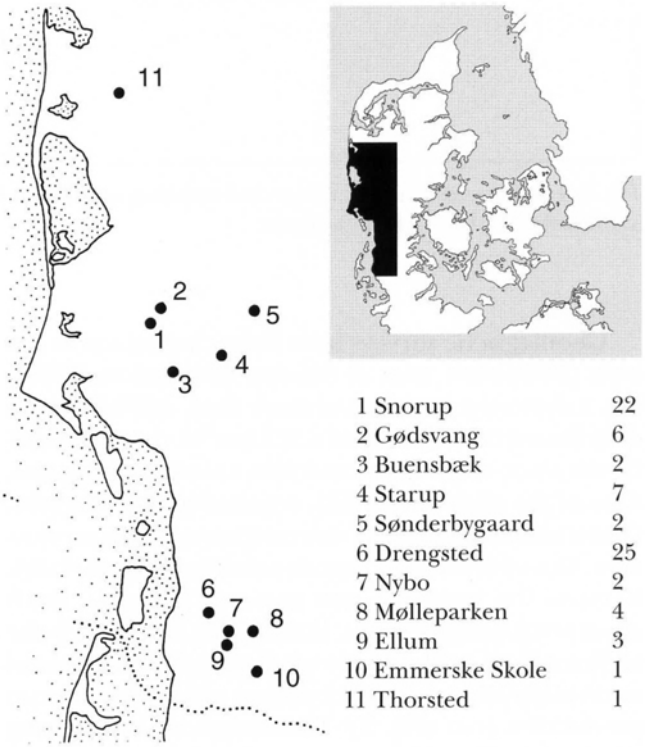

Fig. 1. Map showing the locations of the radiocarbon-dated smelting sites in Jutland. The number of radiocarbon dates from each site is indicated after the site name.

Fig. 2. The Snorup Iron Age village and smelting site. Black dots are slag-pit furnaces. Numbers in circles give the number of radiocarbon datings within a cluster.

Geomagnetic surveys have been carried out at the iron production area at Snorup (Smekalova 2003). Fig. 2 shows the positions of more than 4000 furnaces distributed over an area of c. 0.3 km^2 in clusters of different sizes, alignments and also as isolated slag-pits. One of the alignments, E11, consisting of 14 slag-pits, seems to be the result of one continuous iron production. Ten of the slag-pits are situated in pairs, probably because the furnaces were run two at a time. Such short term events cannot, however, be resolved by the radiocarbon method. Air photography and partial excavation have revealed a village within the Snorup production area (Fig. 2). The houses at the smelting sites are similar to houses in non-iron producing villages found elsewhere in Jutland. This seems to indicate that the farmers themselves carried out the iron production, possibly under the guidance of a local smith or master smelter. According to the potsherds found in the parts excavated, the houses belong to the 4th - 6th century AD. There were no signs of habitation before or after the period of iron production. It is quite possible that the site was colonized because the raw materials for iron smelting, bog iron ore and charcoal were available here. It seems that the site was abandoned when the iron smelting stopped, suggesting that the iron smelting was the basis for the economy. Contemporary farming settlements were also found in limited excavations at Horne, Gødsvang, Yderik and Krarup (see Fig. 3), so it seems that iron smelting sites are commonly connected to settlements.

This connection between settlements and iron production sites is supported by three cases in southern Jutland: at Drengsted, Nybo and Mølleparken. The latter sites have only been partially excavated. At Drengsted 243

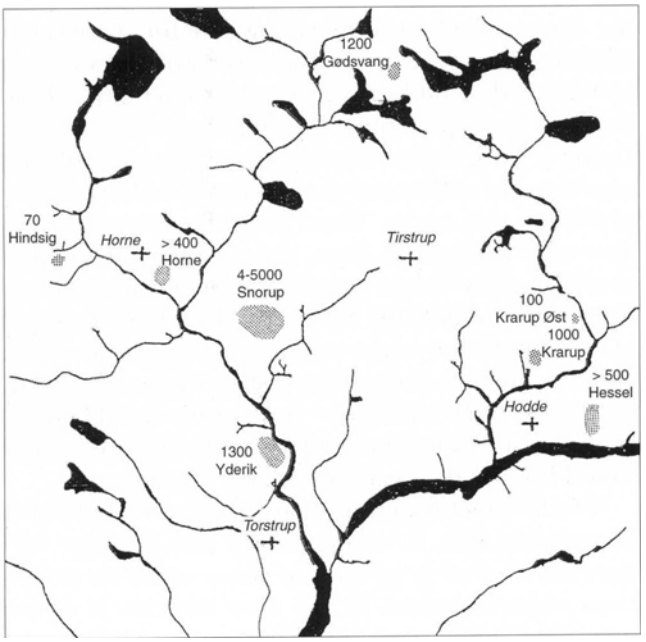

Fig. 3. Within the 10x10 km area around Snorup magnetic surveys have been carried out at seven new smelting sites of different sizes: Hindsig with 70 slag-pits; 300 or more in Horne; Gødsvang with 1200 or more; Yderik with probably 1300; Krarup 1000; Krarup East with 100 slag-pits and Hessel with more than 500. There are four medieval churches in this area: Horne, Tistrup, Hodde, and Torstrup. All are surrounded by cemeteries with stone dikes containing from a few up to several hundred slag blocks and parts of blocks.

slag-pits have been located within the 50.000 m^2 area excavated. Excavations at the settlements at Drengsted revealed pottery and artefacts, which are dated to the 4^{th} and 5^{th} century AD. At Starup, a modern village 16 km southeast of Snorup, some 400 slag-pits, which are only a part of a larger, but destroyed iron smelting site, have been excavated on the eastern and western side of the modern village.

Dating method

The samples for radiocarbon dating were pre-treated according to the standard procedure with hydrochloric acid and sodium hydroxide in order to remove possible contamination with carbonate and humid acid (Mook & Waterbolk 1985). After pre-treatment the organic material was burned in an atmosphere of pure oxygen and thus converted to carbon dioxide, which was further purified in order to eliminate ^{222}Rn, SO_x, and NO_x. Three litres of carbon dioxide at standard conditions was admitted to a proportional counter equipped with a guard counter, where the natural radioactivity was measured for at least 20 hours. $\delta^{13}C$ was measured on 50 samples, i.e. those dated after 1971. These samples were corrected to the terrestrial value ($\delta^{13}C$ = -25 o/oo PDB). The 27 samples dated prior to 1971 were assigned larger standard deviations in order to compensate for the lack of isotopic fractionation correction. The radiocarbon dates were calibrated to calendar years according to the bidecadel atmospheric calibration curve of Stuiver & Pearson (1993) using the calibration program Calib ver. 3.0.3C from University of Washington (Stuiver & Reimer 1993)[1].

It should be noted that whenever possible charred straw was preferred to oak charcoal in order to minimize the effects of any possible external age (i.e. the difference between the age of the sample and the archaeological event to be dated). In some cases further samples from the same site were dated in order to estimate the period of use of the individual sites.

Results

The laboratory numbers, radiocarbon dates, most likely calibrated dates, and calibrated age intervals at $\delta \pm 1$ standard deviation are given in the appendix. Fig. 5 shows an example of the calibration of a radiocarbon date. Calibrating the unimodal normal distributed radiocarbon dates (the y-axis in Fig. 5) frequently results in multimodal (i.e. having several peaks) non-parametric age distributions in calendar years (the x-axis in Fig. 4). This complex multimodal distribution is the final result of the radiocarbon dating.

1. New calibration curves (Radiocarbon 1998) have been introduced during the eight year publishing process for this paper. The differences between the 1993 and the 1998 calibration curves only amount to 5-10 years in the present age range. Considering the uncertainties of the dates and calculations in this paper the introduction of the new calibration curves will have very little influence on the results, and it has thus been decided not to re-calibrate according to the 1998 curves.

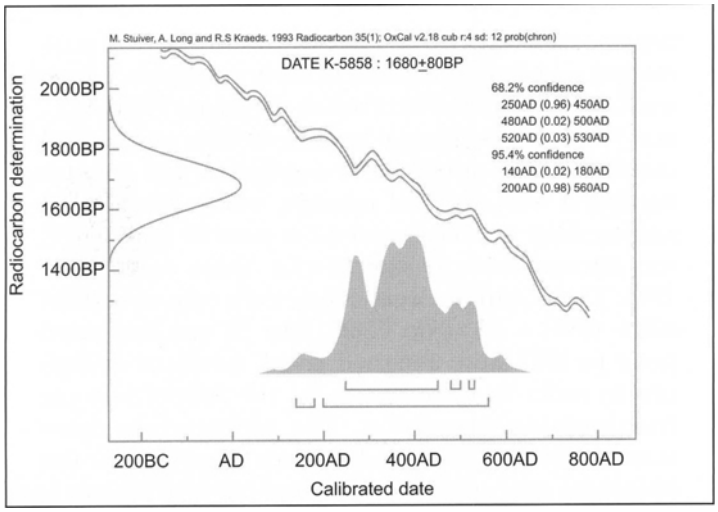

Fig. 4. Example of calibration of one of the radiocarbon dates (K-5858).

The wiggles in the calibration curve especially in the Iron Age (Fig. 5) constitute an inherent ambiguity in the radiocarbon dating technique, as the calendar year probability distributions are broader in these time intervals. A wiggle makes it almost impossible to distinguish dates between approximately AD 430 to AD 550. Fig. 6 shows the calibrated age distributions of the samples from the four major sites included in the present study.

The first analysis to be performed on the data is to establish whether or not the samples can be assumed to be contemporaneous. A hypothesis of contemporaneousness for a set of radiocarbon dates can be tested statistically by a χ^2-test. χ^2-tests show that the probability for all samples being contemporaneous is less than 5% at Snorup, Drengsted, Starup, Gødsvang, and for the data taken as a whole. The dated samples therefore most likely represent prolonged activity rather than an event limited in time to one or two generations.

The next point of interest is whether there is any geographical system for the exploitation within an iron-producing site. At Snorup, where we have 11 radiocarbon dates in an area with a concentration of c. 800 furnaces, we find no significant correlation between location and age, so it is likely that the smelting activity took place randomly within the sites throughout the time of production.

We believe that we have dated a sufficient number of samples from Snorup and Drengsted to ensure that the dated samples are representative for the level of smelting activity at these sites. Accordingly we have constructed a combined probability curve for all the dates at Snorup in order to investigate the possible changes in activity through time (Fig. 7). Adding together the calibrated probability distributions has produced this curve. Three main factors may influence this sum curve. First, the selection of samples could possibly favour samples from certain parts of the period of activity. Secondly, the wiggled nature of the calibration curve could artificially, so to speak, cause an uneven probability distribution and thirdly, the shape of the sum curve could quite simply reflect the level of production activity at the site at different times. Let us address each of these factors.

The first factor that could influence the sum curve is sampling bias. It is conceivable that younger furnaces are better-preserved or more easily accessible than older furnaces. If this were the case it would most likely add probability to the late part of the combined probability curve. The archaeological excava-

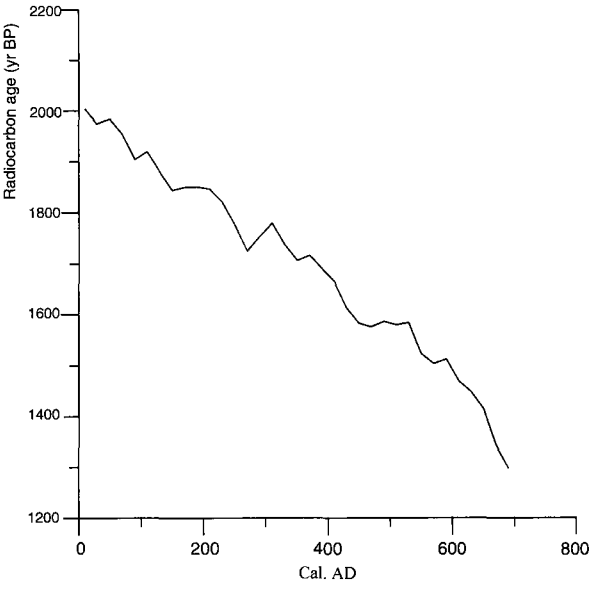

Fig. 5. The radiocarbon calibration curve shows many wiggles in the Iron Age. Calibrating a conventional radiocarbon age into calendar years where there is a wiggle in the calibration curve produces a longer interval of calendar years than would otherwise be expected from a smooth calibration curve. The calibration curve is from Stuiver and Pearson (1993).

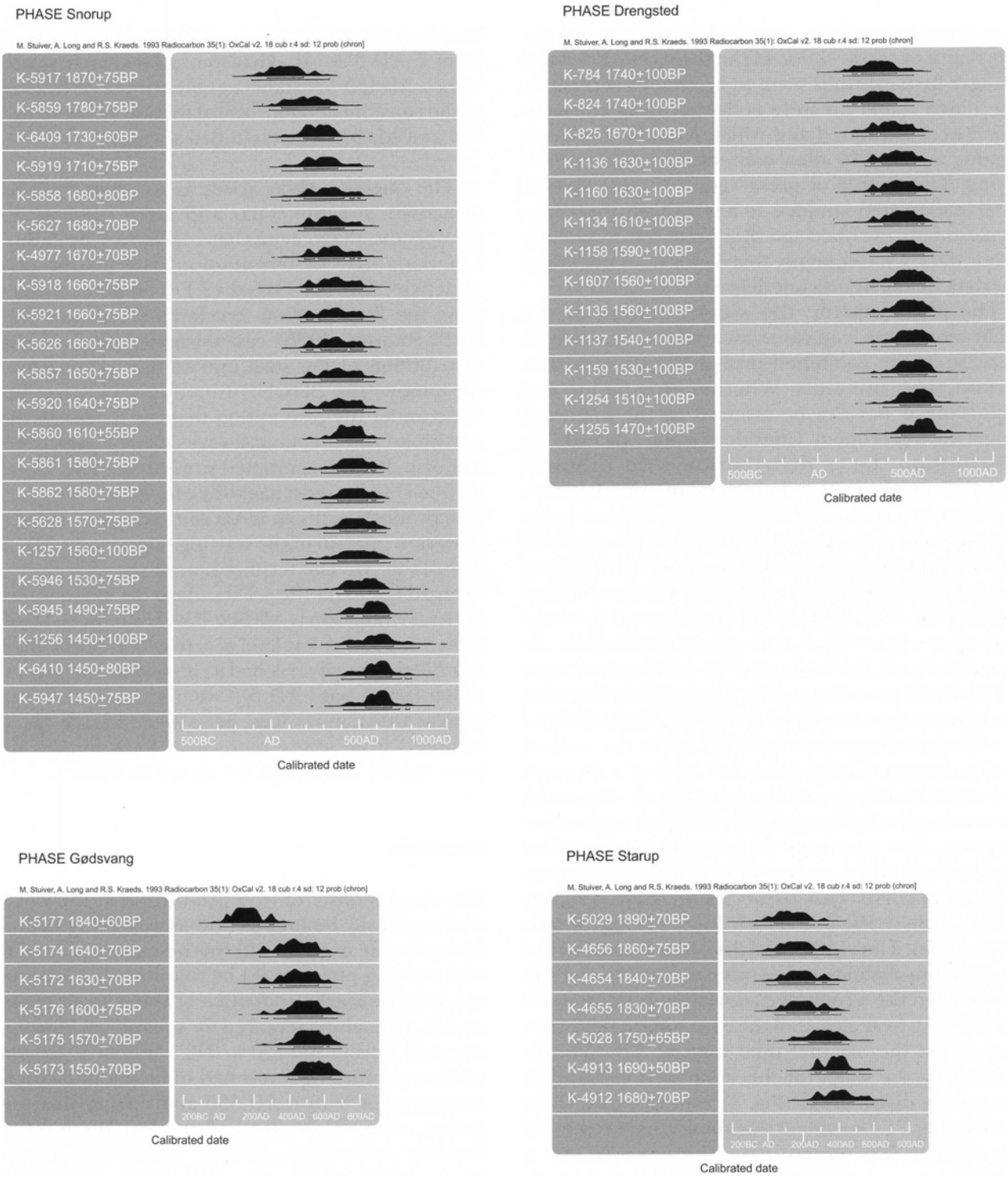

Fig. 6. The calibrated ages for all the radiocarbon dates from the four major sites in the present study.

tions have, however, not revealed any changes in the size, depth or construction of the furnaces. Older and younger furnaces thus seem to be equally accessible. The dated materials were collected from furnaces which were excavated and which contained enough organic material to allow conventional radiocarbon dating. The degree of preservation is quite similar in all investigated samples, so it is unlikely that older furnaces have perished and thus occur less frequently in our data. Consequently this factor does not affect our data to any significant degree.

The second factor, the wiggled nature of the calibration curve, can cause an artificial decrease or increase in the combined probability curve within certain time intervals. Whether this factor was important or not can be assessed by the following numerical experiment. Consider a square probability distribution, i.e. a distribution with uniform probability within a certain interval of calendar years and zero probability elsewhere. Each 20-year-point from this square-formed distribution is transformed into a ^{14}C-age, assigned a common standard deviation and calibrated back into a calendar year probability distribution. Finally these distributions are summed to give a combined probability curve for all dates. As an example we have sampled 13 radiocarbon ages of bidecadel tree ring series from the calibration curve in the time interval AD 330-570. Each of these 13 radiocarbon ages was rounded off to the nearest decade, assigned a standard deviation of ± 65 years and calibrated by use of the atmospheric bidecadel curve using the University of Washington calibration program. This produced 13 individual probability distributions, which were added and normalized to yield a sum curve. This artificial sum curve is shown in Fig. 8, where the initial distribution is also shown (stipled line). The ±1 standard deviation interval of the combined probability curve was calculated to be AD 330-550 and the ±2 standard deviation interval to be AD 230-620. Note how well the ±1 standard deviation interval fits the original time span of AD 330-570. Comparing the shape of this simulated calibration of a square distribution (Fig. 8) with our data from Snorup (Fig. 7) it is evident that these curves resemble one another. It is obvious from this example that a uniform (square) distribution can be altered through the radiocarbon calibration procedure into a shape very similar to the one found for Snorup in the present study. From the comparison of Figs. 7 and 8, shown in Fig. 9, it can be deduced that the level of activity at Snorup is consistent with a uniform production activity from c. AD 330-570. However, a slow starting phase from c. AD 150-330 shows a gradual increase from zero to the constant and uniform activity level between AD 330 and AD 570 when it ended abruptly.

The question then arises as to when the phase of activity at a site starts and when it terminates. No specific sharp boundary dates can be given as a starting date or termination date for the phase of activity, but the OxCal v2.17 computer program from the Radiocarbon Accelerator Unit in Oxford (C.B. Ramsey, 1995) can estimate the probability distribution of the start and of the termination of the phase (the BOUND-function). This has been done under the assumption that the dates represent one phase and that samples are chronologically fairly uniform. For the combined sum curve of all 73 dates we find that the most likely date for the starting of the iron production phase is AD 250 and the ± 1 standard deviation interval of the starting boundary is AD 220-290 (Table 1). The termination of the phase is most likely AD 610 and the ± 1 standard deviation interval of the termination is AD 590-630. Initially, at AD 250, there was a rather low level of activity. At approximately AD 290 the activity reached its high and constant level, which lasted until AD 610 where it ended abruptly. Similar calculations have been made for the specific locations from where more than four samples have been dated. The results are shown in Table 1.

Discussion

The uneven onset of iron production at the various sites can easily be understood as a growing demand for malleable iron. An alternative explanation of the slow starting phase could be that it took a long time to attain the yearly production of about 5 tons of charcoal that was alone required for smelting in Snorup in the period from AD 330 to 570. At least 10 hectares of the surrounding forest had to be put into coppice management before AD 330 and during that same period, the settlers also had to clear the forest for farming and building houses. Typical time intervals for coppicing, 10-30 years, cannot however be distinguished by the radiocarbon method due to wiggles in the radiocarbon calibration curve. According to the archaeological finds the Snorup site was not settled prior to AD 200.

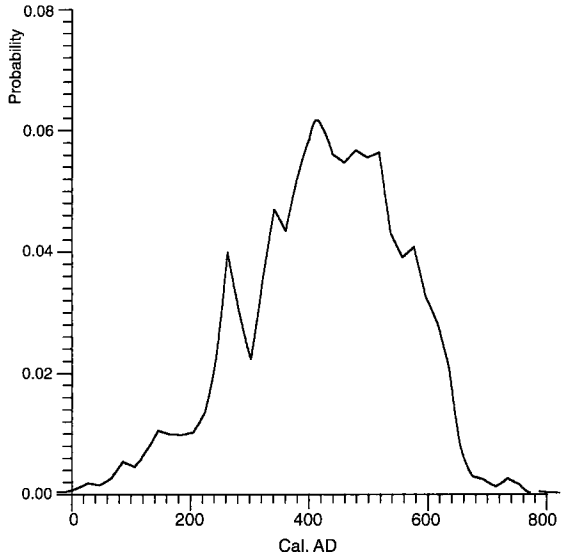

Fig. 7. The combined probability distribution of all the radiocarbon dates at Snorup. The curve has been constructed by stacking the calibrated age distributions from Snorup shown in Fig. 6.

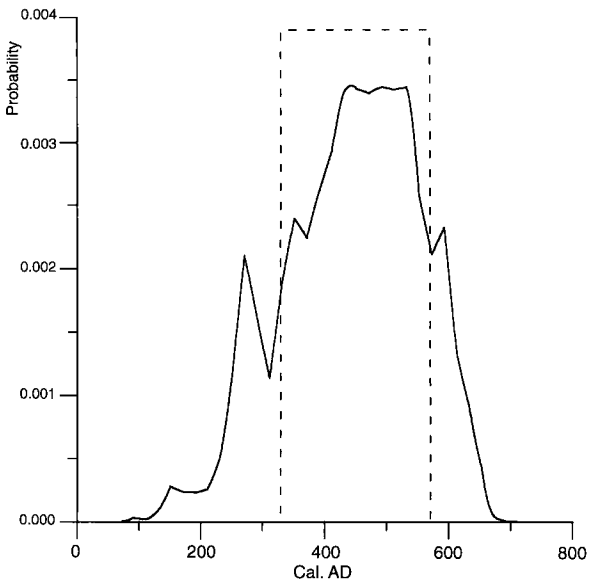

Fig. 8. Results of a numerical experiment showing the effect of the wiggled nature of the radiocarbon calibration curve. An original square calendar year distribution from AD 330 to AD 570 (dashed line) is converted into 13 equally spaced conventional radiocarbon dates using the calibration curve each of which is assigned an uncertainty of ± 65 ^{14}C-years. These 13 conventional dates are calibrated in the usual way and the resulting calendar year probability distributions are summed and normalized (solid line). Some broadening relative to the square distribution is observed due to the wiggled nature of the calibration curve.

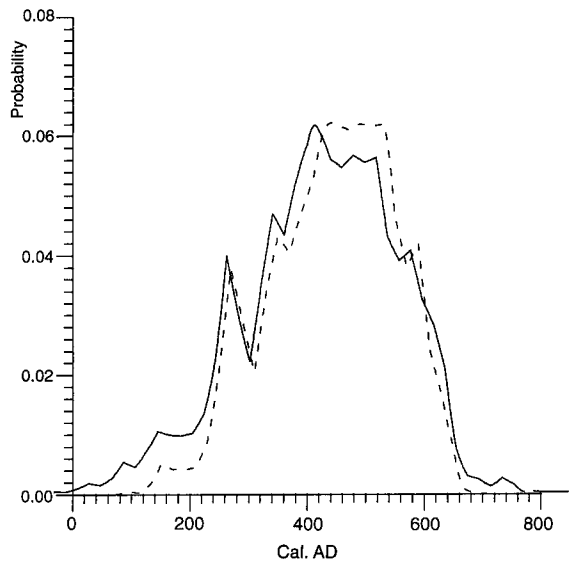

Fig. 9. The combined or stacked probability distribution from the radiocarbon dates at Snorup (solid line) shown together with the probability distribution derived as described in the text and in Fig. 8.

The iron production at the excavated part of the Starup site lasted from AD 140 to AD 340. Snorup, Drengsted, and Gødsvang became major iron production sites in c. AD 350. The production activity here seems to have proceeded at a uniform pace for c. 200 years until c. AD 550, when it terminated abruptly. The reason for ending the iron production at Snorup, Drengsted, and Gødsvang, is not known. The demand for iron in this part of Europe did not diminish neither in AD 340 or in AD 550; quite the contrary - more and more iron tools came into use. It is possible that the 200 years of charcoal production had exhausted the forest to a degree where the charcoal production no longer could take place on a big scale. Archaeological evidence, with only about 10% of the settlement excavated, points to an abandonment of the settlement at Snorup some time in the 6th century AD.

This picture of more or less constant iron production activity over a period of 200 years seems somewhat special for southern Jutland, at least compared to the only other investigation where comparable results have been produced, namely at the iron production site in Joldelund, Nordfriesland (Erlenkeuser & Willkomm 1997). Extensive radiocarbon dating at Joldelund revealed both some geographical differences as well as a somewhat uneven production activity.

Site	Start of phase (most likely date)	Start of phase at ? ± 1 std.dev.	Termination of phase (most likely date)	Termination of phase at ? ± 1 std.dev.	Number of samples dated
Snorup	AD 330	AD 270-360	AD 570	AD 530-630	22
Drengsted	AD 410	AD 340-460	AD 550	AD 500-610	13
Starup	AD 140	AD 70-230	AD 340	AD 280-430	7
Gødsvang	AD 300	AD 140-380	AD 550	AD 470-660	6
All sites	**AD 250**	**AD 220-290**	**AD 610**	**AD 590-630**	**73**

Table 1. Note that the estimates become more uncertain when based on fewer dates. Even though it only comprises seven dates, Starup seems to be an early production site, while the other sites are more or less contemporary with each other. Seen from a statistical viewpoint it is, however, not unlikely that the activity at all the sites, including Starup, has overlapped.

At Snorup, which was active for c. 240 years, a total of 4000 smelts over 240 years gives an average of c. 17 smelts per year. Each smelt produced c. 40 kg of iron yielding c. 670 kg of iron each year(Voss 1995). The production at Snorup proceeded continuously for 240 years or almost nine generations. This amounts to a total iron production at the site of c. 160 tons. A small amount was used in the village, but most of the iron must have been transported to external consumers.

Nine generations of steady primary iron production, which was used for weapons, utensils and other commodities as well as export, must have created some wealth in Iron Age Denmark. Excavations or other information sources do not, however, show any signs of such wealth. The fact that we have here proven a continuous and uninterrupted iron production for more than nine generations calls for further archaeological excavations in the area in search of the possible centre of wealth and power.

Conclusions

Seventy-three samples from iron production regions in Jutland have been radiocarbon dated. No spatial development has been found within the area with respect to time. A combined probability distribution has been constructed as the sum of individual probability distributions of all calibrated dates. The results of our investigation are that the iron production activity took place continuously from the third to the 7th century AD. The shape of the combined probability distribution of the radiocarbon dates is consistent with a fairly uniform iron production activity throughout the period AD 250-610.

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References

Erlenkeuser, H. & Willkomm, H., 1997: ^{14}C-datierungen von holzkohleproben der ausgrabungen in Joldelund. H. Jöns (ed.): *Frühe Eisengewinnung in Joldelund, Kr. Nordfriesland Teil I*, p. 197-215.

Mook, W.G. & Waterbolk, H.T., 1985: *Handbook Archaeologists, No 3, Radiocarbon Dating.* European Science Foundation, 1985.

Ramsey, C. Bronk, 1995: *OxCal v2.0. A Radiocarbon Calibration and Analysis Program. Radiocarbon calibration program OxCal v2.17.* Oxford.

Smekalova, T & O.Voss, 2003: Field Procedures for Magnetic Investigations of Iron Smelting Sites woth Slag Pits. in *Acta Jutlandica* LXXVI:2, Humanities Series 75. Aarhus.

Stuiver, M. & Pearson, G.W., 1993: High-Precision Bidecadel Calibration of the Radiocarbon Time Scale, AD 1950-500 BC and 2500-6000 BC. *Radiocarbon* Vol. 35: 1, p. 1-25.

Stuiver, M. & Reimer, P.J., 1993: Extended ^{14}C Data Base and Revised CALIB 3.0 ^{14}C Age Calibration Program. *Radiocarbon* Vol. 35:1, p. 201-230.

Voss, O., 1993: Snorup. Et jernudvindingsområde i Sydvestjylland. *Nationalmuseets Arbejdsmark* 1993, p. 97-112. København.

- 1995: Snorup - an Iron Producing Settlement in West Jutland, 1st-7th Century AD. In *The Importance of Ironmaking*, Norberg Conference 1995, p. 132-139. Stockholm.
- 2003: The Archaeology of Iron Smelting i Denmark. In: *Archaeometallurgy in Europe.* Milano.

Appendix

The samples were excavated from the base of slag-pit furnaces which lack other dating artifacts. Most samples consisted of charred straw and the dates were calibrated using the 20 years averaged atmospheric curve by Stuiver and Pearson (1993). K-5857 consisted of charcoal (Quercus sp.) from a branch or trunk with more than 40 annual rings. The date of K-5857 was calibrated by use of a 40 year-averaged calibration curve.

Lab. No.	Locality	Site	Sample no.	Radiocarbon Date (BP)	Calibrated Date (AD Cal.)	Calibrated Date at±1? (AD Cal.)	?^{13}C 0/00 PDB
K-6410	Snorup	E11	1535	1450 ± 80	630	550-660	-26,4
K-6409	Snorup	E11	1534	1730 ± 60	270-330	240-410	-26,5
K-1256	Snorup	1	6	1450 ± 100	630	540-670	
K-1257	Snorup	1	7	1560 ± 100	540	410-620	
K-4977	Snorup	100	111	1670 ± 70	410	260-550	-26,7
K-5626	Snorup	100	147	1660 ± 70	410	270-450	-25,2
K-5627	Snorup	100	243	1680 ± 70	400	260-430	-27,1
K-5628	Snorup	800	329	1570 ± 75	540	420-600	-27,0
K-5857	Snorup	300	308	1650 ± 75	410	340-530	-26,6
K-5858	Snorup	500	537	1680 ± 80	400	260-440	-27,6
K-5859	Snorup	500	613	1780 ± 75	250	140-380	-26,9
K-5860	Snorup	500	618	1610 ± 55	430	410-540	-26,6
K-5861	Snorup	500	710	1580 ± 75	460-530	410-590	-27,6
K-5862	Snorup	500	758	1580 ± 75	460-530	410-590	-27,1
K-5917	Snorup	500	529	1870 ± 75	140	70-240	-24,3
K-5918	Snorup	500	574	1660 ± 75	410	270-500	-26,1
K-5919	Snorup	500	583	1710 ± 75	350-370	250-420	-27,9
K-5920	Snorup	500	694	1640 ± 75	420	340-540	-26,8
K-5921	Snorup	500	736	1660 ± 75	410	270-500	-26,0
K-5945	Snorup	500	1028	1490 ± 75	600	540-650	-27,8
K-5946	Snorup	1100	1105	1530 ± 75	550	440-620	-27,4
K-5947	Snorup	1300	1302	1450 ± 75	630	550-660	-26,5

Lab. No.	Locality	Sample no.	Radiocarbon Date (BP)	Calibrated Date (AD Cal.)	Calibrated Date at±1? (AD Cal.)	?^{13}C 0/00 PDB
K-784	Drengsted	EL11	1740 ± 100	260-330	210-420	-
K-824	Drengsted	3	1740 ± 100	260-330	210-420	-
K-825	Drengsted	101	1670 ± 100	410	250-540	-
K-1134	Drengsted	OV	1610 ± 100	430	350-540	-
K-1135	Drengsted	PF	1560 ± 100	540	410-620	-
K-1136	Drengsted	MF	1630 ± 100	420	270-550	-
K-1137	Drengsted	MN	1540 ± 100	540	420-640	-
K-1158	Drengsted	M?	1590 ± 100	450	390-600	-
K-1159	Drengsted	MI	1530 ± 100	550	420-640	-
K-1160	Drengsted	MO	1630 ± 100	420	270-550	-
K-1254	Drengsted	VE	1510 ± 100	560-590	430-650	-
K-1255	Drengsted	VF	1470 ± 100	610	530-660	-
K-1496	Drengsted	AAY	1630 ± 100	420	270-550	-
K-1497	Drengsted	ABJ	1650 ± 100	420	260-540	-
K-1498	Drengsted	ABR	1730 ± 100	270-330	220-420	-
K-1499	Drengsted	ABØ	1640 ± 100	420	260-550	-
K-1500	Drengsted	ACF	1570 ± 100	540	410-610	-
K-1501	Drengsted	ACG	1690 ± 100	390	240-450	-
K-1502	Drengsted	ACH	1670 ± 100	410	250-540	-
K-1503	Drengsted	ACJ	1600 ± 100	440	380-600	-
K-1504	Drengsted	ACK	1590 ± 100	450	390-600	-
K-1607	Drengsted	BAT	1560 ± 100	540	410-620	-
K-1778	Drengsted	7	1720 ± 100	340	230-430	-
K-1779	Drengsted	10	1480 ± 100	610	460-660	-
K-1780	Drengsted	ALD	1620 ± 100	430	340-550	-

Lab. No.	Locality	Sample no.	Radiocarbon Date (BP)	Calibrated Date (AD Cal.)	Calibrated Date at±1? (AD Cal.)	?^{13}C 0/00 PDB
K-4654	Starup	187	1840 ± 70	220	90-320	-26,4
K-4655	Starup	245a	1830 ± 70	220	120-320	-25,8
K-4656	Starup	328a	1860 ± 75	140	80-250	-26,3
K-4912	Starup	316	1680 ± 70	400	260-430	-25,2
K-4913	Starup	139	1690 ± 50	390	260-420	-26,0
K-5028	Starup	136	1750 ± 65	260-320	230-390	-25,1
K-5029	Starup	226	1890 ± 70	130	70-230	-25,4
K-5037	Nybo	239	1700 ± 70	380	250-420	-25,3
K-5038	Nybo	407	1610 ± 70	430	400-550	-23,8
K-1253	Torsted	1	1480 ± 100	610	460-660	-
K-5172	Gødsvang	29	1630 ± 70	420	380-540	-25,4
K-5173	Gødsvang	20	1550 ± 70	540	430-610	-26,7
K-5174	Gødsvang	204	1640 ± 70	420	350-540	-27,2
K-5175	Gødsvang	101	1570 ± 70	540	420-600	-26,5
K-5176	Gødsvang	106	1600 ± 75	440	400-550	-26,9
K-5177	Gødsvang	201	1840 ± 60	220	120-250	-26,5
K-5410	Buensbæk	5	1490 ± 70	600	540-650	-26,5
K-5411	Buensbæk	83	1640 ± 70	420	350-540	-26,1
K-822	Ellum	ad C 22639	1650 ± 100	420	260-540	-
K-5406	Ellum	2026	1530 ± 65	550	440-620	-23,5
K-5407	Ellum	2058	1500 ± 70	600	530-640	-27,5
K-3846	Mølleparken	1037x540	1510 ± 70	560-590	460-640	-26,6
K-3847	Mølleparken	1037x542	1560 ± 70	540	420-600	-25,5
K-3848	Mølleparken	1037x1365	1500 ± 70	600	530-640	-26,3
K-3849	Mølleparken	1037x1373	1550 ± 70	540	430-610	-24,2

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Detector sites and settlement archaeology on Bornholm. A survey of "productive sites" from the Iron Age and the Viking Age 1996-1999

by Margrethe Watt

ABSTRACT

Extensive phosphate mapping and analysis of samples from culture layers has provided an overview of the extent and state of preservation of 31 selected settlements with preserved settlement layers from the Iron Age and the Viking Age on Bornholm. Problems associated with the investigation methods and representativity of the material are discussed against the background of preliminary analyses of 30000 artefacts recovered either as surface finds or with the aid of metal detectors from more than 400 settlement sites. A small number of representative settlements is presented along with an overview of the most important finds. The article concludes with an outline of settlement development.

INTRODUCTION AND BACKGROUND FOR THE PROJECT

Bornholm is the part of Denmark in which the largest number of settlements from the Iron Age and Viking Age has been registered relative to the total area. Since the mid-1970s, when cemeteries still dominated the discussion on the island (Becker 1975), the discovery of settlement sites from the Iron Age and the Viking Age has accelerated, first and foremost due to the well-developed collaboration with amateur archaeologists (Watt 1997).

Since the mid-1980s reconnaissance of several hundred ploughed-over settlement sites, both with and without the use of metal detectors, has resulted in a dramatic increase in the number of finds of artefacts which have lain, for shorter or longer periods, in the top-soil. All in all this amounts to about 30000 stray finds of artefacts. Additionally there are about 30 hoards with coins and hack metal, primarily from the Late Viking Age.

Knowledge of the extent and character of the many ploughed-over settlements was very limited until the end of the 1990s. Compared to the situation in the rest of southern Scandinavia, only a very limited number has been subjected to traditional open excavation. None of them can be said to have been investigated in full, but several have, however, given an overview of house types from the Early and Late Iron Age as well as the Viking Age and the Early Middle Ages (e.g. Watt 1983). Of the at least 425 registered settlements, at least 60 are estimated to have preserved culture layers of unknown extent (Fig. 1)[1]. At the same time, it is presumed that these culture layers, the thickness of which in a few cases exceeds one metre, function as a kind of store, which in the course of repeated ploughing account for the many detector finds and the marked dark coloration of the top soil (Watt 1998). Due to the often complicated stratigraphy there has

[1] The term "preserved culture layer" indicates: a – actual settlement layers with large quantities of material from burnt or unburnt houses along with deposits from the immediate vicinity of these, e.g. refuse layers with abundant finds and animal bones; b – an old vegetation or cultivation layer with settlement indicators, typically in the form of small amounts of charcoal, finely-fragmented clay daub along with possible workshop debris and (dependent on the conditions of preservation) small fragments of animal bones. Traces of structures and pits which are only preserved in the subsoil are not considered as culture layers in this respect, but are naturally included in the survey.

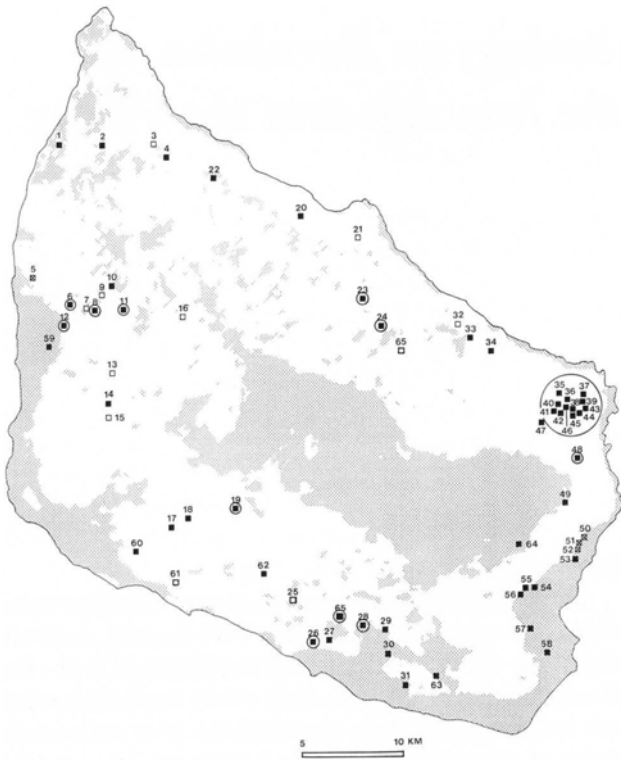

Fig. 1. Iron Age and Viking Age settlement sites with culture layers on Bornholm. Settlements included in the extensive sampling programme are marked with a circle: 6. Skovgård/Nygård, sb. 190, Klemensker parish; 8. Møllegård, sb. 202, Klemensker parish; 11. Ladegård, sb. 195, Klemensker parish; 12. Rødbjerg, sb. 201, Klemensker parish; 19. Smørengegård, sb. 144 Vestermarie parish; 23. Agerbygård, sb. 201, Østerlars parish; 24. Rytterbakken, sb. 178, Østerlars parish; 26. Sandegård, sb. 33, Åker parish; 28. St. Gadegård, sb. 160, Pedersker parish; 35-46. The Ibsker complex with, among others, Sorte Muld and Dalshøj, sb. 93 and 135, Ibsker parish; 48. Munkegård, sb. 49, Ibsker parish; 65. Runegård, sb. 202, Åker parish.

been a tendency to refrain from carrying out large-scale excavations of these settlement sites.

Of all the settlements from the Iron Age and the Viking Age which were recorded up to the middle of 1999, at least 20% were occupied during both the Early and the Late Iron Age. More than 50% are dominated by finds from the Viking Age and/or the Early Middle Ages. At the same time, preliminary analyses of the detector and surface finds have shown that the majority of these originate from less than 10% of the settlement sites.

The large sites in particular showed a marked continuity of settlement with surprisingly uniform dating profiles, dominated by artefacts from the Germanic Iron Age, but often also with a significant content of material from both the Roman Iron Age and the Viking Age.

Trial investigations

On the basis of a memorandum prepared by the author the State Antiquary initiated a project in 1996 with the aim of obtaining an overview of the state of preservation of as many as possible of the find-rich settlement sites[2]. This was to be achieved partly through the collation of information, partly through an extensive sampling programme.

In 1996 an extended trial investigation was carried out at the settlement of Agerbygård/Bakkegård, close to the round church at Østerlars. A combination of artifact distribution and phosphate analyses could here be related to the extent and stratigraphy of the culture layers as studied in a number of narrow trial trenches through the site (Watt 1998). On the basis of the experience gained here an extensive sampling programme was carried out in 1997 and 1999, involving the majority of settlements in the Ibsker complex, with Sorte Muld at the centre, as well as a number of other find-rich settlement sites. In all 31 black-earth settlement sites or settlement areas, corresponding to about half of the sites which originally were presumed to have preserved culture layer, were included in the investigation (Fig. 1).The extensive sampling programme comprised coarse phosphate mapping at top-soil level, and collecting, wet-sieving and sorting of samples from the culture layers (Watt 1998, 214ff.). In the collection of both phosphate and culture layer samples attempts were made to cover the sites with a fairly regular and uniform sampling net. The sampling programme during 1996-1999 comprised a total area of about 1 000 000 m^2. In all, 2839 phosphate samples

[2] Bornholms Museum journal number 2525; RAS P. 3239/97. Documentation for the trial investigations at the individual settlement areas is available in the form of reports with detailed descriptions of the collection principles, procedures, descriptions of the stratigraphy, analyses, artefacts, maps, along with an evaluation of the individual localities.

were collected and analysed and about 1000 representative 20 litre samples of the preserved culture layers were sieved and sorted. During the course of the whole process it was important to ensure that the work was as far as possible non-destructive. At the same time it was a condition that costs were kept to a minimum. Part of the investigation was, accordingly, aimed at finding a balance between the lowest possible cost and a professionally acceptable level of documentation as a basis for future discussion regarding the protection or investigation of ploughed-over settlements with culture layers. In the overall evaluation of the many settlement sites, results from earlier investigations and an analysis of the very extensive body of finds from the top-soil, both play a decisive role[3].

Selection criteria

The selection of settlement sites to be included in the investigation was based on a combination of criteria. In addition to the presence of culture layers, the *abundance of finds in the top -soil (including hoards)* as well as *settlement continuity at individual sites* was of major significance. Other factors such as *the geographical distribution, topographic location* and *the soil conditions* also contributed to the selection process.

Several of the find-rich settlement sites included in the investigation have been known for many years. Of the 20 settlement sites mentioned by E. Vedel in *Bornholms Oldtidsminder,* and which accordingly have been known for at least 100 years, almost half were included in the trial investigations (Vedel 1886, 339ff.).

Among the sites with a long settlement continuity is the large group of settlements around Sorte Muld in Ibsker parish. Several of these were established already by the Late Pre-Roman Iron Age (Watt in prep.). A significant chronological spread can also be seen on the larger black-earth settlements elsewhere on the island, for example Smørenge, Sandegård and Rytterbakken, while others, such as Møllegård and Agerbygård, are dominated by finds from the Late Germanic Iron Age and the Viking Age (Fig. 1 nos. 19, 26, 24, 8 and 23; cf. Fig. 5).

Within the numerous and rapidly growing group of settlements characterised by the presence of Baltic ware (*Østersøkeramik*), several of which have yielded hoards of coins and hack silver, the proportion of pre-Viking finds is usually significantly less. Even though the top-soil at the Late Viking Age sites is sometimes quite dark in colour and finds are relatively numerous, these sites, however, have a different character from the typical black-earth sites from the Iron Age. In order to gain an overview of the possible presence of a culture layer and the conditions of preservation at the late hoard sites, some localities were chosen which, in the light of their finds, are presumed to represent the chieftain's farms of the period. Among these are Ladegård in Klemensker, Munkegård in Ibsker and Store Gadegård in Pedersker (Fig. 1 nos. 11, 48 and 28).

Both the typical black-earth sites and the majority of the many late settlement sites with Baltic ware lie on heavy to moderately heavy clay soils. The greatest clay content is registered at the settlements in the Ibsker complex. The large and very find-rich settlement at Sandegård lies on moderately heavy clay soil and, furthermore, in an area where drifting sand has influenced both the formation and the preservation of the culture layers.

Relatively few of the recorded settlements lie on the areally-limited islands of glacial or late-glacial sand and gravel, of which the largest continuous areas are found in southern Bornholm in Pedersker and Poulsker parishes as well as around Grødby in Åker parish. The settlement area at Store Gadegård in Pedersker was chosen in order to obtain a representation of settlements on light soils with finds from different periods (Fig. 2). Here there was the possibility of demonstrating whether dark coloration of the sandy top soil is also associated with an underlying culture layer, and whether the clusters of houses, seen in dry summers as growth differences in crops on part of the settlement area, are due to total destruction by ploughing, or whether houses could possibly be preserved at different levels, separated by layers of blown sand and earth as at Runegård in the Grødby area (Fig. 1 no. 65) (Watt 1983).

[3] The data bases which form the foundation of this work were constructed by the author in connection with publishing the finds from Sorte Muld and the Ibsker settlement complex along with a planned presentation of the finds from the detector sites on Bornholm. The databases, comprise about 30 000 artefacts. Most of the finds are kept at Bornholms Museum. A number of the artefacts (almost exclusively metal finds) is also registered at the National Museum in Copenhagen in connection with the administration of Treasure Trove, while small portions, primarily of the non-metallic finds, are still in private ownership.

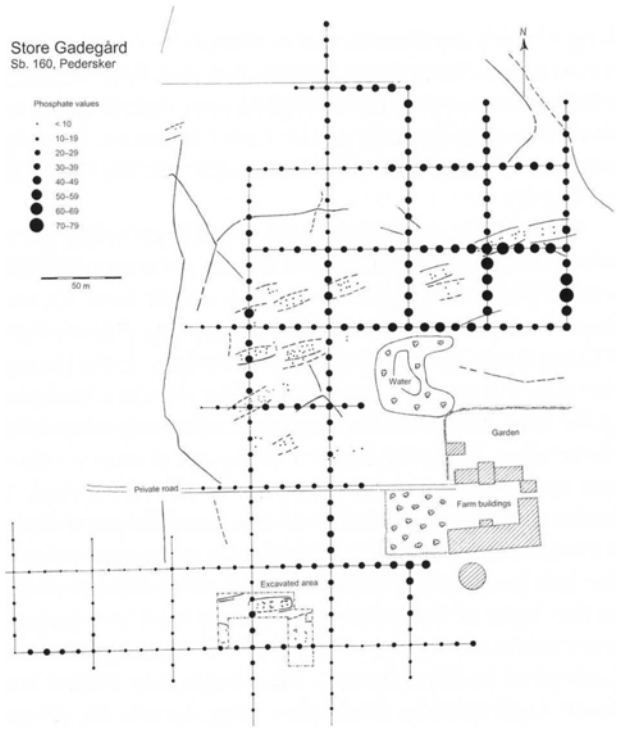

Fig. 2. Phosphate map for the settlement area at Store Gadegård, sb. 160, Åker parish. The house remains have been drawn on the basis of crop marks visible on the aerial photographs

Phosphate mapping

It is well known among archaeologists that phosphate accumulates as poorly soluble compounds in areas of prehistoric settlement. Phosphate mapping has been used since the 1930s both in connection with ordinary excavations and, since the 1980s, more routinely for locating settlements (e.g. Hartmann 1984; Östergren 1989; Hartmann 1991; Zimmermann 1992; Jørgensen et al. 1993). Various field and laboratory methods are used in phosphate mapping (Hartmann 1991; Persson 1996). For both practical reasons and for the sake of the comparability of the results, commercial laboratory analyses[4] were used in the Bornholm black-earth project.

When interpreting the results of the analyses it is important to be aware of the fact that the content of phosphoric acid in the top-soil does not, of course, give a synchronous picture of the underlying settlement, but in principle reflects the accumulated ploughed-up material. The fact that the samples were taken in the top-soil, and were therefore a kind of mixed sample, is due in the first instance to the wish to gain an *overall* impression of the settlements. Samples taken below the top-soil (in the culture layer, old soil surface/fossil top-soil or subsoil) would give greater and, in principle, more exact fluctuations, but could at best only be interpreted through subsequent open excavation. Furthermore, physical factors such as the nature of the soil, moisture, the actual crops and repeated fallow can play a role with regard to the comparability of the individual settlement sites.

The phosphate samples in the project described here have been collected consistently every 10 metres along transects laid out strategically relative to the colour of the soil, the distribution of finds and other settlement indicators (charcoal, fragments of daub, burnt stones, etc) (e.g. Figs. 2, 7a, 9a and 19a). Each phosphate sample typically represents an area of 250-300 m^2. In comparison, Majvor Östergren, in the Gotland hoard project, operated with a sample density of one sample per c. 400 m^2, which she saw as the minimum to give a satisfactory overview of a settlement site (Östergren 1989, 55). In order to ensure a fall in phosphate values to the local background level, sample collection was typically continued 30-40 metres beyond the distribution limit of the finds and other settlement indicators. The sampling network was considered fine enough to be able to reveal any possible division of the settlements into smaller units.

In an evaluation of the results of the analyses, account has been taken of the local background level, such that the term "elevated phosphoric acid value" refers to at least a three-fold increase in phosphate values and a "greatly elevated phosphoric acid value" refers to at least a ten-fold increase.

The results of the analyses showed that at almost all the settlement sites investigated a marked relationship could be seen between the level of phosphoric acid, the dark coloration of the top soil and the many detec-

[4] All samples from 1997 and 1999 were analysed at Stein's Laboratory. The Danish Plant Directorate's "culture control method no. 3" was used in the analyses, by which the phosphate content, after extraction with dilute acetic acid is determined spectrophotometrically as phosphorous molybdenum blue. A small number of repeat analyses have shown great consistency between different batches. For this reason the results of the analyses are considered to be comparable.

tor and surface finds, especially from the Late Iron Age. At the same time a clear difference was seen in this period between central areas (areas with house remains) with high phosphate values and a steep phosphate gradient and marginal areas with moderate values and a shallower gradient. The phosphoric acid values in areas (of the same soil type) which are dominated by finds from the Roman Iron Age are, in contrast, often somewhat lower.

The two settlement sites on sandy soil (Store Gadegård and Runegård, the latter a control area) showed more modest phosphate values. This is despite the fact that long-term settlement, and in places also remains of culture layers proper, were found at both sites. The lower phosphoric acid values are presumably due to a greater flow of water through the soil and, accordingly, more rapid leaching of the phosphoric acid to a lower level.

Collection, sieving and sorting of samples from culture layers

Bulk samples were collected stratigraphically from the culture layers according to the same network as the phosphate samples, as a rule at 20 metre intervals (i.e. corresponding to every second phosphate sample). Every sample, representing about 30 cm of the layer and with a volume of about 20 litres, was wet-sieved through a 3 mm net, after which the material retrieved on the sieve was dried and sorted[5]. During sorting of these samples the content of finds and other settlement indicators was registered on forms. These were compared with observations in the field. The sieved remains were also swept with a magnet in order to collect possible magnetic iron, e.g. hammer scales[6].

During collection of the culture layer samples the character and composition of the culture layer was constantly evaluated. Here a distinction was made between central areas with proper culture layers, typically with large amounts of clay daub and abundant pottery, representing houses and their immediate surroundings, and marginal areas, where the samples contained only smaller amounts of clay daub, charcoal (old vegetation or plough layers?) and fewer finds, some of them of a different character (workshop areas). In places where the culture layer had dried out at the time of sampling, it was difficult or impossible to gain a true impression of the content of settlement indicators. This was, on the other hand, revealed during sorting of the sieved samples. A surprisingly large number of sieved samples was found to contain fish-bones, including those from sites situated a long way from the coast.

Both during the collection of the samples from culture layers and the subsequent sieving and sorting of the materials, remains of burnt houses stood out very clearly, whereas traces of unburnt houses were only rarely obsereved. This is presumably due to the fact that unburnt clay (clay daub and possible remains of clay floors) is more readily assimilated through cultivation and natural processes in the soil than the remains of burnt clay walls, which in some cases made up a large part of the sieved sample.

At many settlement sites it could be seen that the modern top-soil was darker than the culture layer lying directly beneath and in addition also often contained more immediately visible settlement indicators. This situation is presumed to reflect a concentration of non- or slowly-degradable settlement material (charcoal, burnt clay daub and possible finds) in places where ploughing has removed the original settlement layer proper and has now reached the older vegetation and cultivation horizons. The situation does, however, vary from place to place, depending on the local soils which influence the consistency of the culture layer.

A comparison of the phosphoric acid values with the thickness of the culture layers shows that high phosphate values reveal, on the one hand, that a culture layer exists, or has existed, at the settlement site but they do not, on the other hand, reflect its present thickness.

Both the sampling programme and a series of traditional excavations at Iron Age settlement sites on Bornholm have shown that the culture layers which were formed in the Early Iron Age have generally a

[5] To reduce the transportation of soil in connection with wet-sieving, the samples from the culture layers were in some cases reduced on site by dry sieving through a 3 mm net. Due to the generally high clay content it was not, however, possible to reduce the samples from the Ibsker area. No marked differences in the yield of the subsequent wet-sieving could be observed as a result of inserting this extra process at some sites.

[6] Thanks to Henriette Lyngstrøm, PhD, for advice and guidance in connection with the identification of smithing debris.

large volume of soil relative to the number of finds (corresponding to a high rate of accumulation) while the reverse appears to be the case in those from the Late Iron Age. This situation could be observed, for example, during sieving of large culture layer samples taken from the transverse profiles at Agerbygård. Here the holes dug for posts for houses, which represent various later building phases, cut deeply into the thick, but relatively find-poor layers from the Roman Iron Age (Watt 1998, Fig. 4).

Erosion and conditions for preservation

One of the project's main aims was to carry out an evaluation of the general state of preservation of the settlement sites. Efforts were made to establish the level to which ploughing had reached at the individual settlement sites, partly based on datable finds (primarily pottery) which were observed at the surface and which were recovered during sorting of the sieved samples, and partly through a comparison with the dating profiles which became apparent from the total find material. On this basis it can be stated that on the majority of settlement sites today, ploughing has penetrated deep into the Early Iron Age layers.

An attempt was made to evaluate *the erosion rate* at the few localities from which there was information about the thickness of the culture layer from earlier investigations. One of the sites from where such information exists is *Rytterbakken* near Østerlars. In 1980 several parallel trial trenches were excavated These showed that the culture layer then was up to 80 cm thick, representing the burnt remains of several partly superimposed houses, of which the latest appears to be from the Germanic Iron Age (Nielsen 1982)[7]. In 1988 a fibre-optic cable was laid across the site. In connection with this the thickness of the culture layer was registered as c. 50 cm where it was thickest[8]. During the trial investigations in 1999 nowhere did the preserved culture layer exceed a thickness of 30 cm, and is believed to date primarily from the Roman Iron Age. *That is to say that at this site about 50 cm of the culture or settlement layer, corresponding to about 2/3 of the total stratigraphy, had disappeared in the course of less than 20 years.*

More general observations in connection with the sampling programme suggest that a similar situation exists at other settlement sites. During a follow-up investigation in 1983 in the western part of the settlement area at *Smørenge* in connection with the appearance of a hoard comprising denarii and solidi, the thickness of the exposed settlement layer was registered as being at least 30 cm (Kromann & Watt 1984)[9]. Today, the culture layer, which is presumed to be the reason for the dark coloration of the plough soil over the very large settlement area, appears to be destroyed down to thin vegetation or cultivation layers.

The general impression is that the cultivation pressure has been extreme everywhere during the last 10-20 years and that only exceptionally (for example on the central part of the Sorte Muld settlement site) are find-rich culture layers preserved from the Late Iron Age and the Viking Age. Analyses of the finds (see below) suggest that the heavy ploughing activity has very probably also resulted in the great majority of metal artefacts, especially from the Late Iron Age, now present in the top-soil.

The finds

In connection with the study of the material from the large settlement complex around Sorte Muld a systematic registration was carried out of about 30 000 surface or detector finds from around 400 settlement sites from the Iron Age and the Viking Age on Bornholm. As there are very great differences in the number of finds from one settlement site to the next, it is primarily material from the find-rich settlement sites which is included in the statistical analyses. The great majority of the artefacts came to Bornholms Museum in the period between 1983 and 2000 but also privately-owned artefacts have, to a certain extent, been included. The most important reasons that the surface finds from Bornholm's settlement sites can be used at all in cultural-historical and methodological studies

[7] Bornholms Museum journal number 750. Report by Finn Ole Nielsen.

[8] Bornholms Museum journal number 750. Note from Jørgen Seit Jespersen.

[9] Sb. 144, Vestermarie parish. Report by Margrethe Watt 1983. Bornholms Museum journal number 766.

are their abundance and the fact that, originating as they do from many different settlement sites, they are able to reveal patterns of variation and repetition in the find spectra.

The follow-up investigation at Sorte Muld in 1986-87 in connection with the appearance of a large number of gold foil figures (*guldgubber*), made systematic wet-sieving of the top-soil and sorting of the sieved remains a necessity. This considerable task revealed what a find-rich active top-soil can contain in the way of archaeological material (Watt 1991; Watt 1997). In brief, it was noted that the wet-sieved material was dominated by non-metallic finds (over 75%), while the metallic finds comprised less than 25% of the total. In comparison, metallic finds from the subsequent more than 10 years of detector and surface reconnaissance made up about 70% of the material recovered (Watt 2000; Watt in prep.).

Observations at the large detector sites, including those outside Bornholm, underline the importance of being aware of the factors which influence the representativity of the material (e.g. Jørgensen & Pedersen 1996; Nielsen 1997; Jørgensen 1999; Paulsson 1999)[10].

Survival and retrieval

The chances of the finds surviving in an active top-soil are difficult to estimate precisely, partly because the most common metals, iron and bronze, are affected differently by mechanical and chemical factors.

Iron artefacts are the most vulnerable, both with respect to physical survival in the top-soil and with respect to retrieval. Since the end of the 1980s the retrieval of iron has been influenced both by legislation concerning winter green fields and an increasing incentive to cultivate winter crops. This has meant that detector reconnaissance today is often carried out on newly-sown or newly-germinated fields and is therefore subject to restrictions with regard to the digging up of iron. This, together with the temptation to exclude iron entirely when carrying out detector reconnaissance, has resulted in a clear under-representation of iron artefacts at the majority of settlement sites. A targeted retrieval of iron at a small number of sites has shown that important material is lost in this way. This is most clearly seen in the discrepancy between, for example, the relatively frequent occurrence of iron fibulae in graves on Bornholm, while these often fragile iron fibulae only rarely appear on the ploughed-over settlement sites with an otherwise good representation of contemporaneous finds.

With regard to bronze, the fragmentation of various artefacts is dependent, in part, on how compact they are in form. Observations of mechanical wear on fractured surfaces suggest that at least some artefact types are able to survive for a very long time in an active top-soil, while others quickly become fragmented. This, of course,will influence their relative representativity. Several examples of re-located hoards from the Viking Age in particular show that coins and hack silver can survive for a long time (in some cases more than 100 years) in a regularly ploughed field (Watt 1998, 213).

When material collected by surface reconnaissance or by the use of metal detectors is used in research it is also important to have an understanding of *how, and to what extent, the composition of the find material is influenced by the level of experience, systematic qualities and temperament of the individual collector.* A continuous exchange of experience within the large group of active amateur archaeologists on Bornholm has resulted in a relatively uniform collection pattern. This is reflected in the correspondingly uniform find profiles for the sites searched with metal detectors (Fig. 3, left column). In contrast, settlement sites where traditional surface reconnaissance has also been carried out show, not surprisingly, a markedly greater proportion of non-metallic finds (Fig. 3, right column).

The most attractive settlement sites, or parts of sites, are often exposed to intense reconnaissance at the cost of representative and systematic coverage. The influence on the usefulness of the distribution maps produced in this way is seen most clearly through the results of recent years' systematic detector reconnaissance on the large settlement area at Uppåkra in Skåne (Paulsson 1999, 51 and Fig. 4a-b).

The statistical treatment of the finds from the Iron Age and the Viking Age settlement sites on Bornholm in some cases has revealed apparently inexplicable anomalies. On closer examination these have proved to be due to pre-sorting by individual collectors or their wish to retain certain finds that they are not obliged to hand over by law.

Finally, the usefulness of detector finds in scientific

[10] For a more detailed discussion of the problems of representativity see also Watt (2000).

analysis is influenced by *the administrative practice* of individual museums, which undergo constant changes as the number of incoming finds increases. This applies in particular registration and conservation priorities and to educational aspects in relation to the finders (Watt 1997, 139).

Find analyses

At the majority of settlement sites with finds from both the Early and the Late Iron Age, a striking increase in the number of datable finds can be observed during the Roman Iron Age. Differences in the level of erosion between individual settlement sites appear not to change this picture significantly (Fig. 5).

The excavations at Tissø on Sjælland have shown that under optimal conditions a clear connection can be seen between detector finds in the top-soil and the underlying settlement remains (Jørgensen & Pedersen 1996). However, in cases of settlement sites with several overlying settlement phases, as at many of the black-earth sites on Bornholm, the situation rapidly becomes more complicated. Despite the methodological problems summarised above, a find distribution pattern of significance for an evaluation of the settlement's structure becomes apparent. Gold finds and hoards of denarii/solidi from the Migration Period are rarely found outside the central part of the settlements (with house remains). As a rule, most hoards appear to have been buried within, or close to, the central part of the settlement. In contrast this is not always the case with the many coin and hack metal hoards from the Viking Age and the Early Middle Ages. Investigations at sites such as Munkegård in Ibsker have shown, accordingly, that hoards from these periods may also be hidden outside the settlement area itself[11].

Correspondingly, a comparison of the find distribution maps with the results of the trial investigations has shown that finer metalwork (represented by ingots and casting debris of silver and bronze) was often carried out within the central part of the settlement, whereas ironworking, as a rule, was relegated to marginal areas. Among the interesting by-products of the sampling programme are the common occurrences of smithing debris in the sieved samples from the periphery of the majority of settlement sites. This suggests that there was a wish to keep the activities associated with a potential fire hazard at a distance from the living quarters. Conversely, smithing debris is only rarely seen in the sieved samples from the central parts of the settlements. As there is not always a significant number of datable finds (pottery) in the sieved samples from the marginal areas of the settlements, the smithing debris is only securely dated in exceptional cases and is therefore not necessarily contemporaneous on individual settlements. At the settlement sites where iron has been collected with some degree of systematic detector reconnaissance, finger sized iron ingots or clumps of pig iron are often found confirming that smithing was widely practised.

Type profiles

Detailed studies of the range of types at a large number of settlement sites can, through comparison with grave finds, contribute to a revelation of general problems of representativity. An example is a series of fibula spectra from the Late Germanic Iron Age. These show that early types, especially broad equal-armed fibulae, dominate in strikingly uniform quantities at the settlement sites (Fig. 4 left), while later fibulae types principally occur in graves (Fig. 4 right). Collectively, the examples are presumed to give a realistic impression of the range of fibulae present in the period. They also confirm that duck bill fibulae were the most tenacious everyday jewellery, in the same way that the equal-armed fibulae were in the Viking Age, an observation confirmed through studies of the finds from Uppåkra (Hårdh 1999; Callmer 1999).

Dating profiles

Despite individual differences in the erosion level of the settlement sites, the dating profiles from almost all the find-rich Iron Age settlement sites are strikingly uniform, with a culmination of the closely-dated finds at the beginning of the Late Iron Age (Fig. 5). This dominance of finds from the Late Iron Age often

[11] Bornholms Museum journal number 2212. Report (by Hanne Wagnkilde) on the follow-up investigation in 1995 in connection with the finding of a hoard from the Late Viking Age.

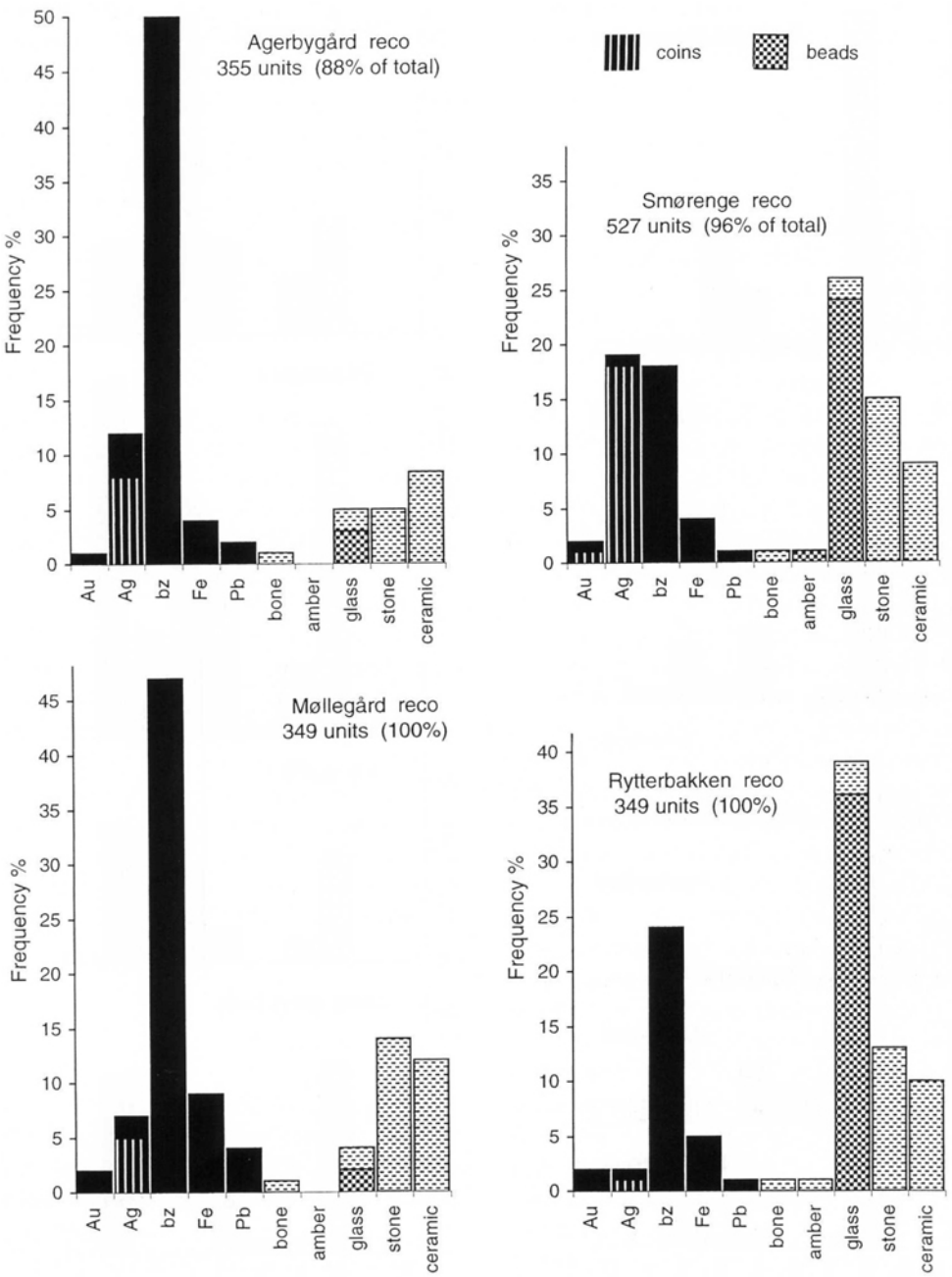

Fig. 3. Find profiles from selected settlement sites. The finds are presented as a percentage of the total detector and surface finds.

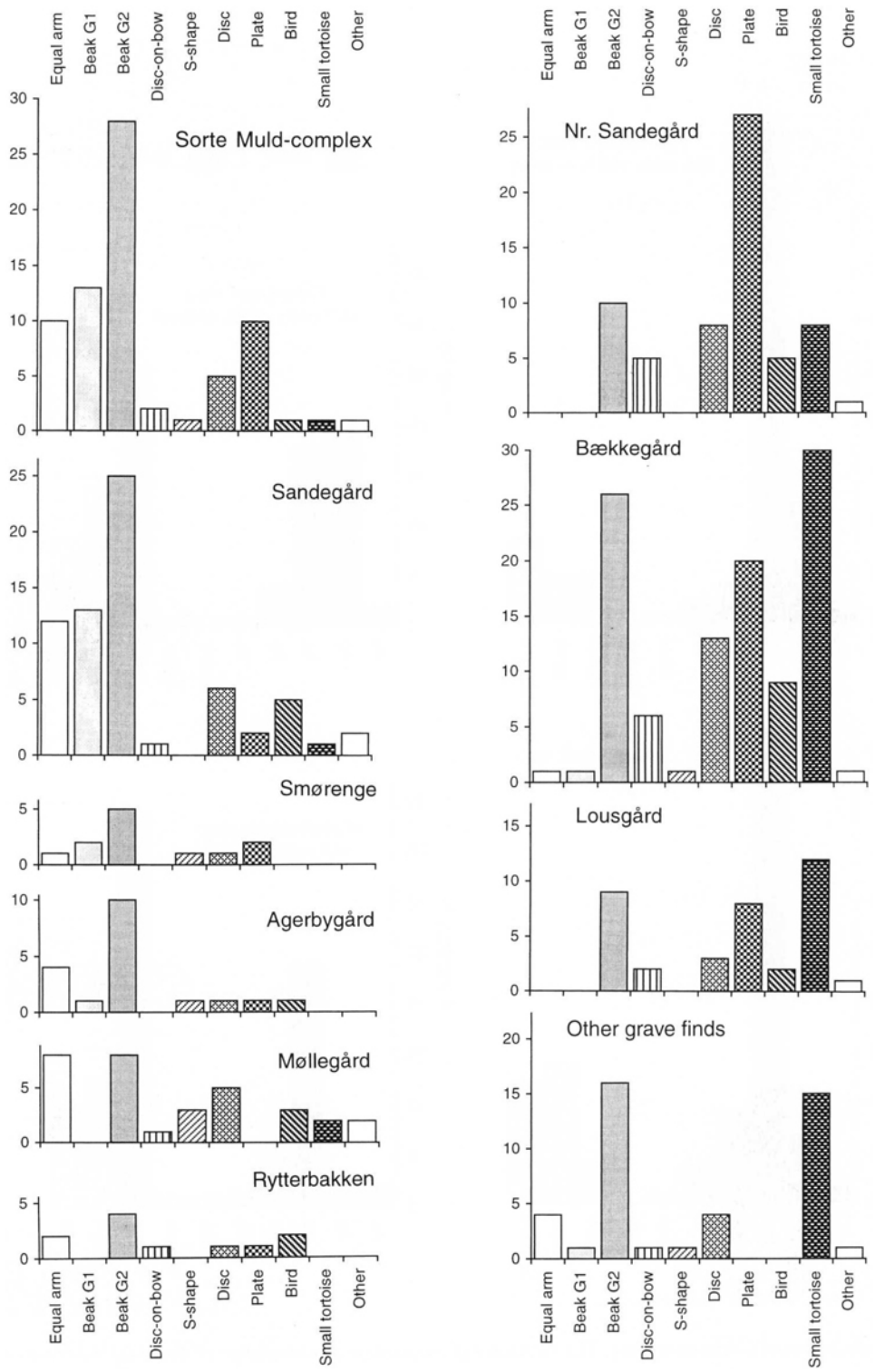

Fig. 4. Frequency spectrum for different fibulae types from settlement sites (left) and graves (right) from the Late Germanic Iron Age.

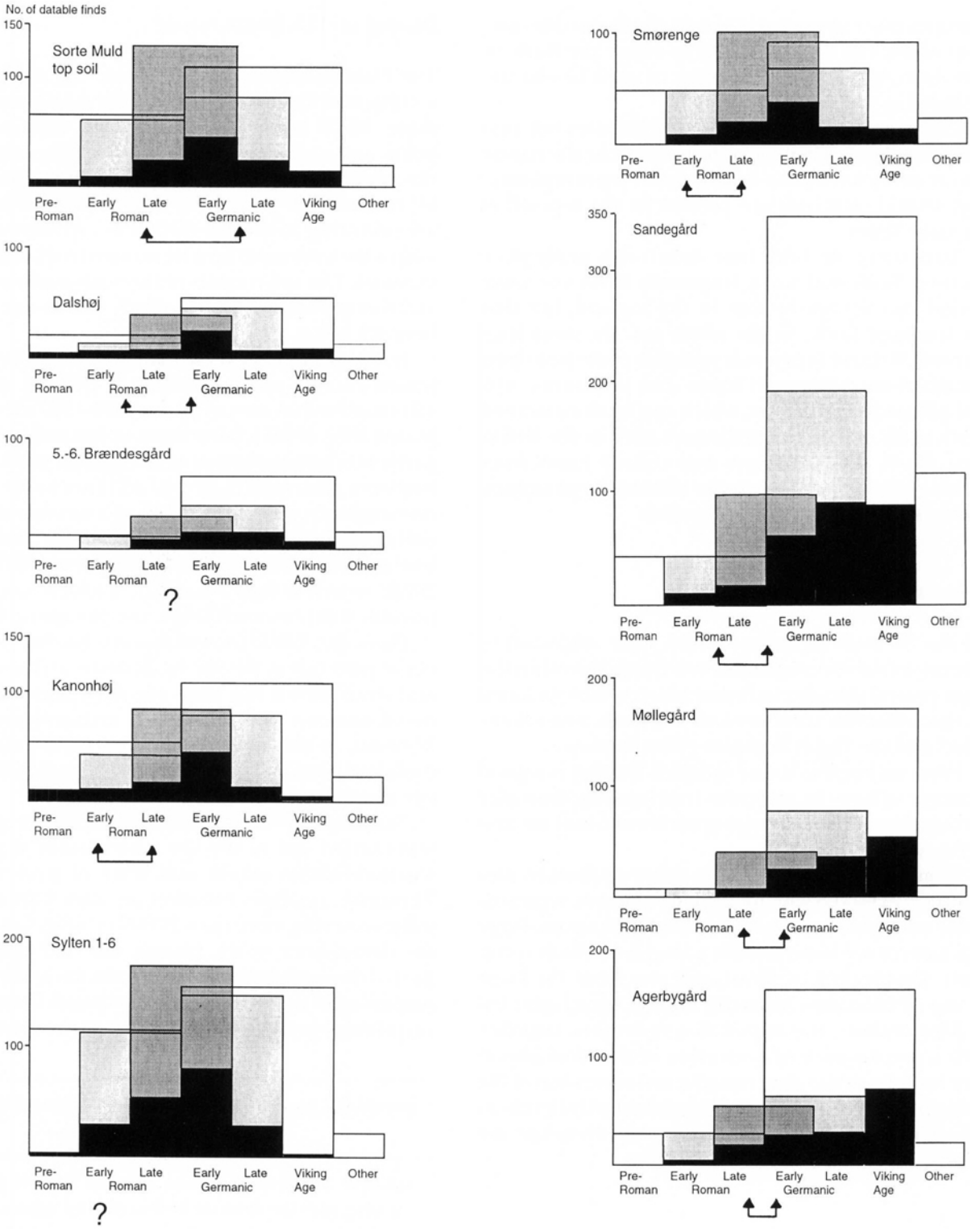

Fig. 5. Dating profiles from selected settlement sites in the Ibsker complex (left) and the rest of Bornholm (right). The arrows mark the estimated erosion level of the settlement sites.

becomes more apparent if less-precisely datable artefacts which can only be dated to either the Early or Late Iron Age (e.g. the majority of glass beads) are included in the analysis.

The typical situation where later features cut into Early Iron Age settlement layers may well be the reason why, at many settlement sites, artefact types representing several centuries are present in the top-soil at the same time.

Analyses of the finds have shown that newly ploughed-up finds and worn fragments from the same period can lie side-by-side in the top-soil, but that the youngest finds, on the whole are, the most fragmented. Some of these finds probably come from long ploughed-out settlement layers and structures. The complicated stratigraphy, which can be documented particularly well at the settlement sites in the Ibsker area, shows that structures and culture layers from widely differing periods may be affected by ploughing within short distances of each other.

The individual settlement sites

Of the 31 settlement sites which were subjected to extensive trial investigations, two thirds lie within the large central complex in Ibsker which will be included in the collective treatment of the finds from Sorte Muld and the Ibsker complex (Watt in prep.).

From within the Ibsker complex Dalshøj is a good example of how the extensive trial investigations play an important role in bringing earlier excavations into perspective.

From among the numerous other settlement sites routinely explored with metal detectors, two representative examples have been chosen; one from the large black-earth settlements with a long settlement continuity (Sandegård in Åker) and one from the large group of farm sites from the Viking Age (Ladegård in Klemensker). It is hoped that these sites, together with a presentation of a selection of the most important finds from the sites, can give an impression of the cultural-historical and research potential inherent in the surface and detector finds from the Iron Age and Viking Age settlements on Bornholm.

Dalshøj, sb. 135, Ibsker parish[12]

The Dalshøj settlement (Fig. 1 no. 46) today lies as a cultivated field on a north- and northeast-facing slope, 50-55 metres above sea level, with meadows below and a view over the Baltic Sea. The settlement site, which lies only 200 metres from Sorte Muld (Fig. 6), is seen after ploughing as a poorly-defined dark area covering at least 20-30 000 m^2. At several places within the settlement area ice-scoured rock surfaces lie exposed. The soil consists of clay with pockets of sand and damp areas which are partly due to the uneven bedrock below.

In the period between 1950 and 1953 Ole Klindt-Jensen carried out excavations at Dalshøj, which in all comprised an area of about 1200-1300 m^2 (Klindt-Jensen 1957, 185ff.). Nine more-or-less well preserved, partly overlapping houses were exposed, most of them had been destroyed by fire. In addition to the houses, investigations were carried out of a number of pits as well as a stretch of cobbled road which lay 'at the same level as house remains A-B' (Klindt-Jensen 1957, 16 and 203ff., as well as Figs. 7 and 10), of which remains are possibly still preserved below the ploughing level[13].

Since the 1980s reconnaissance has been carried out at intervals at the site by amateur archaeologists, and since 1989 it has been regularly scanned with a metal detector by the amateur archaeologist Klaus Thorsen. At the latest registration (1998) about 250 finds had been collected from the plough soil, primarily metal artefacts.

Sampling. In 1999 an extended sampling programme was carried out at the site which made it possible to establish its extent and state of preservation. Phosphate analyses revealed an area with elevated values covering more than 20 000 m^2 (Fig. 7a). Despite the disturbance of the plough soil over the central part of the settlement site, which the excavation at the beginning of the 1950s must have caused, there is a still surprisingly good agreement between the dramatically

[12] Bornholms Museum journal numbers 1639 and 2156.

[13] Amateur archaeologist Klaus Thorsen reports that when passing with the detector he can pick up signals from the cobbled area on the southwestern most part of the settlement site, but that it cannot be followed with certainty over a longer stretch.

elevated phosphoric acid values in the plough soil and the house remains investigated by Klindt-Jensen. The phosphoric acid values suggest that the settlement had extended up to the ridge to the south where it joins the settlement area around Baunehøj, Sønderhøj and Kanonhøj (Fig. 6). During the collection of samples it could be seen that there was striking agreement between the dark coloration of the plough soil and phosphoric acid values greater than 30.

The evaluation of the culture layer at the settlement site is based on sieved samples collected at 42 points which, with the exception of Klindt-Jensen's excavation field, were evenly distributed over the whole of the settlement site (Fig. 7b). The trial investigations showed that the actual settlement layer lay within the area of elevated phosphoric acid values (above 40), not least around and to the northeast of the earlier excavation area. This confirms that Klindt-Jensen's investigations here (in contrast to his excavation at Sorte Muld) included the central part of the settlement.

The thickness of the culture layer varied greatly, which is due partly to the fact that it is preserved in pockets in the underlying bedrock. A sharp fall in the terrain northeast of the old excavation area may have resulted in an accumulation of settlement or clearance layers here. In several places, especially in the southwestern part of the site, it was noticed that the modern plough soil was significantly darker than the thin underlying culture layer. This is probably due to the fact that the plough soil here comprises primarily ploughed-up, originally charcoal-rich, settlement material (burnt-out houses, cooking pits). This is confirmed indirectly by the »tongue« of finds which extends from the central part up towards Bavnehøj (Fig. 7c-d).

According to information from Klindt-Jensen, ploughing in the 1950s affected in particular house remains from the Roman Iron Age and the beginning of the Early Germanic Iron Age.

Older settlement layers on the whole seem to have been untouched. The pottery collected now from the top-soil, and which dominates the culture layer samples from the sampling pits, suggests that ploughing of the settlement site today largely affects culture layers from the Roman Iron Age.

The finds. With the exception of a hoard containing

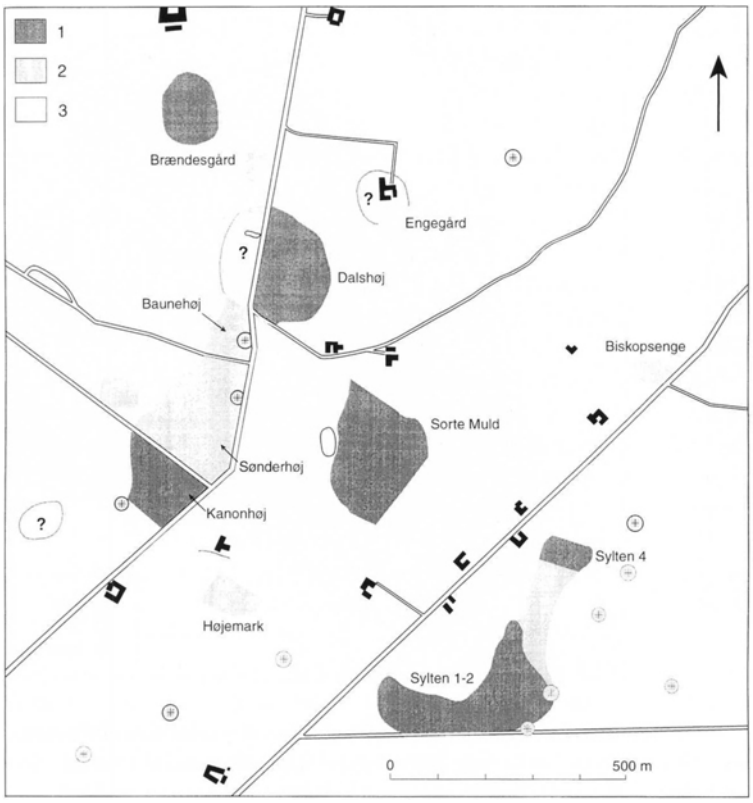

Fig. 6. The settlement sites of the Ibsker complex showing the frequency of reconnaissance: 1. regular reconnaissance (more than 10 times); 2.reconnaissance carried out 5-10 times; 3. reconnaissance carried out less than five times.

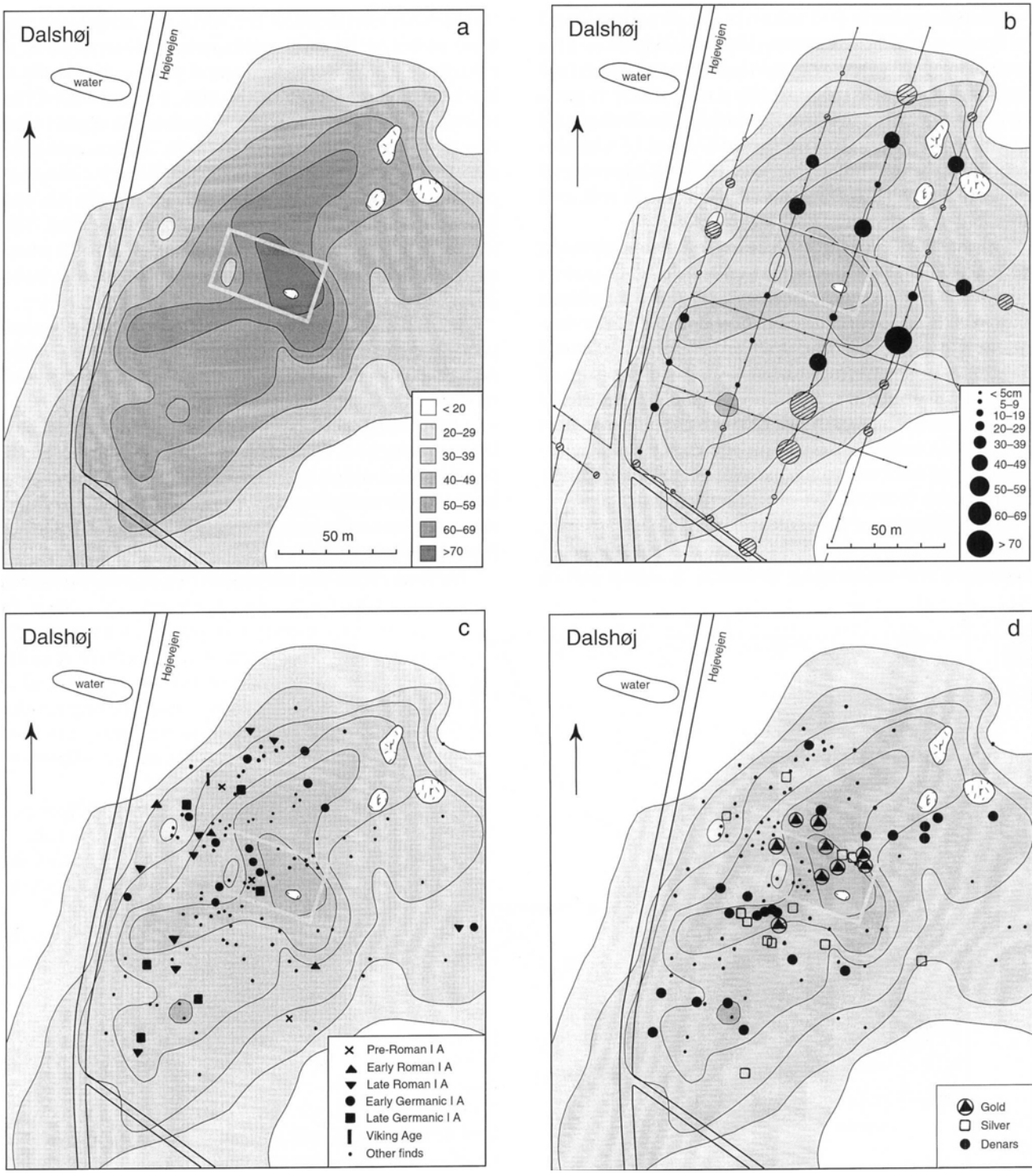

Fig. 7. The Dalshøj settlement site, sb. 135, Ibsker parish. Trial investigation 1999. (a) Phosphate map, (b) sampling lines and thickness of the culture layer (black circles mark compact culture layers, hachuring indicates peripheral areas) (c) dated finds, (d) precious metal and coins from detector reconnaissance. The rectangular area marks Klindt-Jensen's excavation (1950-53).

solidi and a relief brooch, the finds from Klindt-Jensen's 14 months of excavations are relatively modest. Of the c. 300 artefacts from later detector and surface reconnaissance, there is a single solidus (Honorius 393-423) as well as 31 denarii from the 1st and 2nd centuries AD. The solidus found with a detector, along with other finds of precious metal, was retrieved close to the area where a hoard containing a total of 17 solidi, hack gold and a relief brooch was found during Klindt-Jensen's investigations (Klindt-Jensen 1957, 186ff.). However, the even distribution of denarii over the whole settlement area suggests that they were never part of a single hoard (cf. Fig. 7d).

Among the 35 fibulae found by detector in the top-soil there are, not surprisingly, many of Early Iron Age types. Among the later finds is a stamp-decorated gold finger ring and a fragment of a buckle of gilded silver with Style 1 ornamentation (Fig. 8). Finds from the Late Germanic Iron Age are few and from the Viking Age there is only a polyhedral weight and possibly a glass fragment from a pointed beaker. The relatively large number of early finds are clearly seen by comparing the dating profile for the site with that of other settlement sites (Fig. 5).

The find distribution map (Fig. 7c) reveals that while the finds from the Early Iron Age are found spread over the whole site, the majority of finds that can be dated to the Early Germanic Iron Age, including fragments of glass beakers (especially Snartemo beakers), come from the central part of the settlement. It should, however, be mentioned that a certain amount of re-deposition of the top soil must have occurred in connection with the excavation.

Fig. 8. Clasp of gilded silver, matrix for the production of waffle-patterned gold foil and a stamp-decorated gold finger ring from detector reconnaissance of Dalshøj. Scale ca. 1:1. Photo: Nationalmuseet (clasp), others M.Watt.

Several pieces of bronze casting debris have been retrieved, especially in the western part of the settlement. Iron slag and an elongated iron ingot were found down-slope from the settlement. The fact that smithing of iron has taken place just here is confirmed by the presence of smithing debris in a sieved sample from this area. In addition a matrix for the production of waffle-patterned gold foil was found about 30 metres down-slope from the houses (Fig. 8).

Overall evaluation of the settlement site at Dalshøj. The part of the settlement which was investigated in 1950-53 is estimated, on the basis of the 1999 sampling, to only constitute around 5% of the total area of 20-25 000 m^2. However, it includes a significant portion of the central part of the settlement. The high phosphoric acid values which continue to characterise the excavation area are probably due to the fact that the soil from the excavation was put back to cover the excavated area. Even though a certain mixing of the soil must have taken place in the areas affected by Klindt-Jensen's excavation, the marked agreement between the investigated house remains, the high phosphate values and the number of finds from the top-soil cannot be a coincidence.

The finds of smithing debris in the sieved samples suggest that the workshop areas, which were probably part of the settlement, lay at the margins of the site, where the prevailing wind carried sparks away from the settlement itself.

The results of Klindt-Jensen's excavations, combined with the dating profile from the detector finds, give important information about settlement continuity at the site. It appears to have been established at the latest in the Late Pre-Roman Iron Age, from whence the earliest detector finds also originate. The majority of datable finds from later reconnaissance must, however, relate to a large settlement from the Late Roman and Early Germanic Iron Age which was destroyed many years ago by ploughing. In the Late Germanic Iron Age and Viking Age the number of finds declines further, suggesting that the settlement site at Dalshøj must have been abandoned already in the Early Viking Age.

Sandegård, sb. 33, Åker parish[14]

The settlement site at Sandegård in Åker parish (Fig. 1, no. 26) lies in the southern part of Bornholm between Boderne and Raghammer Odde, about one kilometre from the coast with a unobstructed view of the Baltic Sea. After ploughing, the settlement area stands out as a dark-coloured slightly elevated area covering almost 40 000 m^2. The southern part of the settlement area in particular, has been affected by blown soil and sand. The sand content decreases gradually towards the north, where in places ploughing has reached the clay-rich subsoil. Depressions due to compaction within an area of about 200 m^2 at the southern and eastern end of a pond on the northeastern margin of the site mark recent infilling. The possibility cannot be excluded that some of the finds which have been retrieved here come from addition of soil from the adjacent parts of the settlement site.

The settlement area at Sandegård is mentioned for the first time in connection with the laying of drains in 1869, when Emil Vedel described the finding of "3 Byzantine gold coins and several gold objects" (Vedel 1886, 398 and 400ff.; Klindt-Jensen 1957 Fig. 130). During a small investigation at the site in the same year, Vedel observed "that the top-soil was to a great extent dark in colour to a depth of about 1 "Alen"[ca. 63 cm], beneath this yellow clay, which, to a depth of ¾ "Alen" contained occasional flecks of charcoal and red-burnt clay. In many places cobbled areas consisting of fist-sized stoned were noted and among these a floor was found measuring at least 10 "Alen" across and consisting of massive sandstone flags" (Vedel 1886, 400f.).

In 1952 O. Klindt-Jensen carried out a small excavation at the site were he demonstrated "an almost totally ploughed-out farm site which had burned down" (Klindt-Jensen 1957, 236). In 1990 the site was inspected in connection with the ploughing up of about 10 sandstone flags each up to 60 cm across which appear to correspond to those described by Vedel[15].

During recent drainage work culture layers and pits have been observed in the eastern part of the settlement site. According to information received from a previous owner these in places reached a depth of a couple of metres below the present surface.

Since the middle of the 1980s the settlement site has been subjected to reconnaissance with and without the use of a metal detector. This has produced about 1000 artefacts[16]. Amateur archaeologist Jack Simonsen, who has regularly carried out reconnaissance at the site has, however, observed that the yield during recent detector scanning has fallen dramatically. At the same time it can be seen in the material that the relative proportion of small fragments is on the increase. It seems therefore a fair assessment that the top soil, after 12-15 years of detector reconnaissance, is virtually empty of metal artefacts.

Sampling. During the investigations in 1999 about 219 phosphate samples were collected on a 30×40 metre network covering an area of c. 50 000 m^2. The results of the analyses showed elevated phosphoric acid values within an area of 150×200 metres, corresponding to about 30 000 m^2 (Fig. 9a). The values are greatly elevated in two areas; one area of about 3000 m^2 centered about 100 metres north of present day Sandegård (Sandegård Vest), the other of at least 10 000 m^2 centred about 100 metres northeast of the farm buildings (Sandegård Øst).

105 samples of culture layer were collected at 59 points. The investigations showed that settlement layers proper, up to one metre in thickness, were preserved, especially in the samples within the areas with strongly elevated phosphoric acid values (Fig. 9b). Occasionally the sampling cut through easily recognisable cooking pits with charcoal and fire-shattered stones. A large content of well-preserved bones (including fishbones) is suggestive of refuse pits. Blown earth and sand has contributed to the formation of the culture layers both in the central part of the settlement site and on the southern and eastern periphery. This is apparent from the culture layer's sporadic sandy or mealy consistency. Potsherds, burnt clay daub, charcoal, animal bones and smithing debris, which were also found spread throughout the drift sand layers, show that the drifting of sand and earth took place already during the time when the settlement was in use. Thin sandy vegetation layers were observed in several places below the settlement layers.

[14] Bornholms Museum journal number 1371.

[15] Report by Dorte Dam 1990.

[16] The settlement was first subjected to detector reconnaissance by Ingvard Pedersen, later by Jack Simonsen. The area has also been searched for surface finds by Solveig Andersen.

As at other settlement sites which were included in the sampling programme, there was a marked distribution of the smithing debris in the sieved samples from the marginal areas of the settlement at Sandegård. In occasional samples from the northwestern periphery of the settlement the sieved remains contained more than 75% smithing debris. Smithing debris was, on the contrary, extremely rare in samples from the central areas of the settlement. The sieved samples are dominated by bones and potsherds, the great majority of

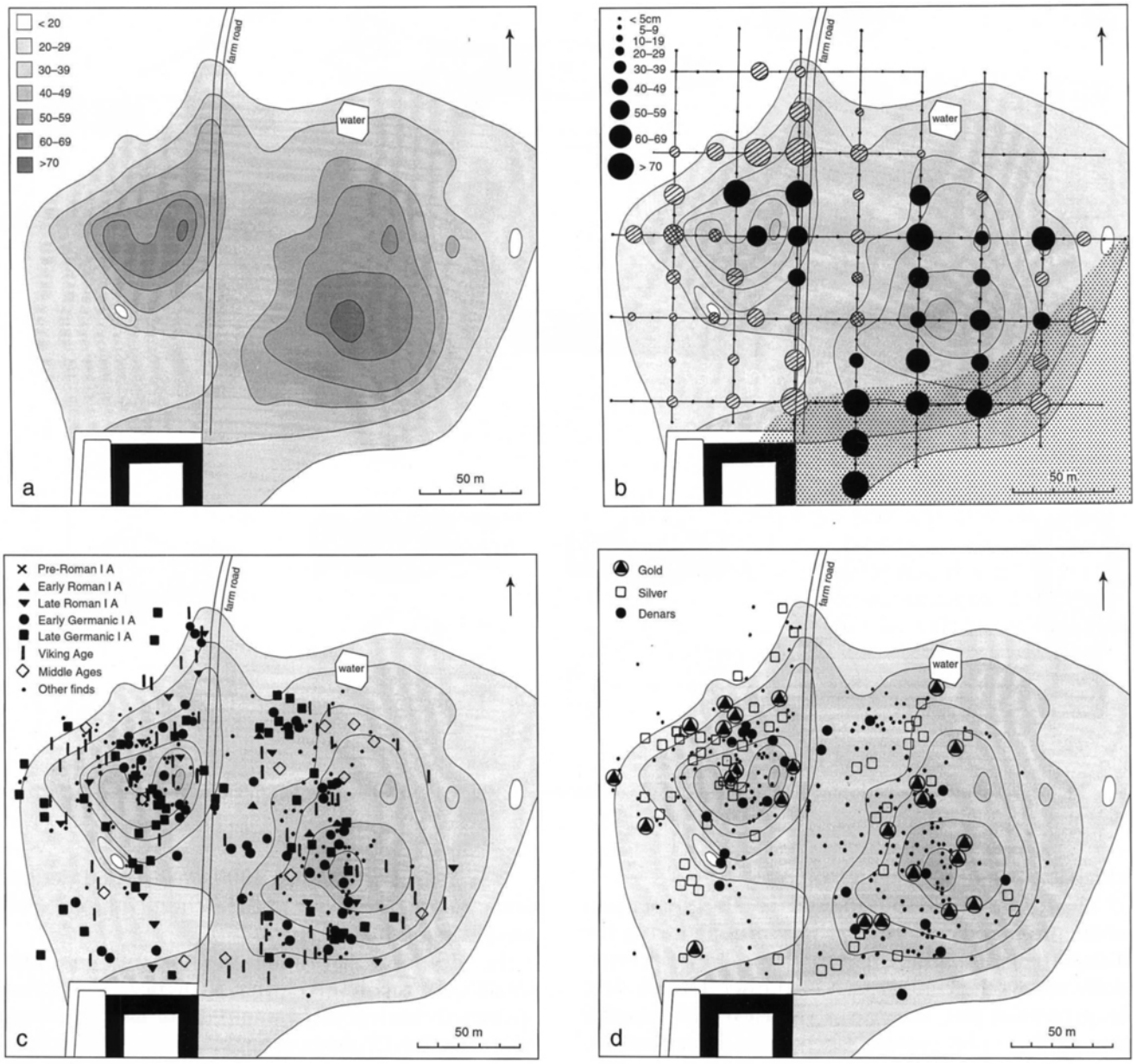

Fig. 9. The settlement area at Sandegård, sb. 33, Åker parish. Sampling programme 1999. (a) Phosphate map, (b) thickness of the culture layer (black circles mark compact culture layers, hachuring indicates peripheral areas), (c) dated finds, (d) precious metal and coins from detector reconnaissance. The stippled area marks the part of the settlement site influenced by wind-blown sand and earth.

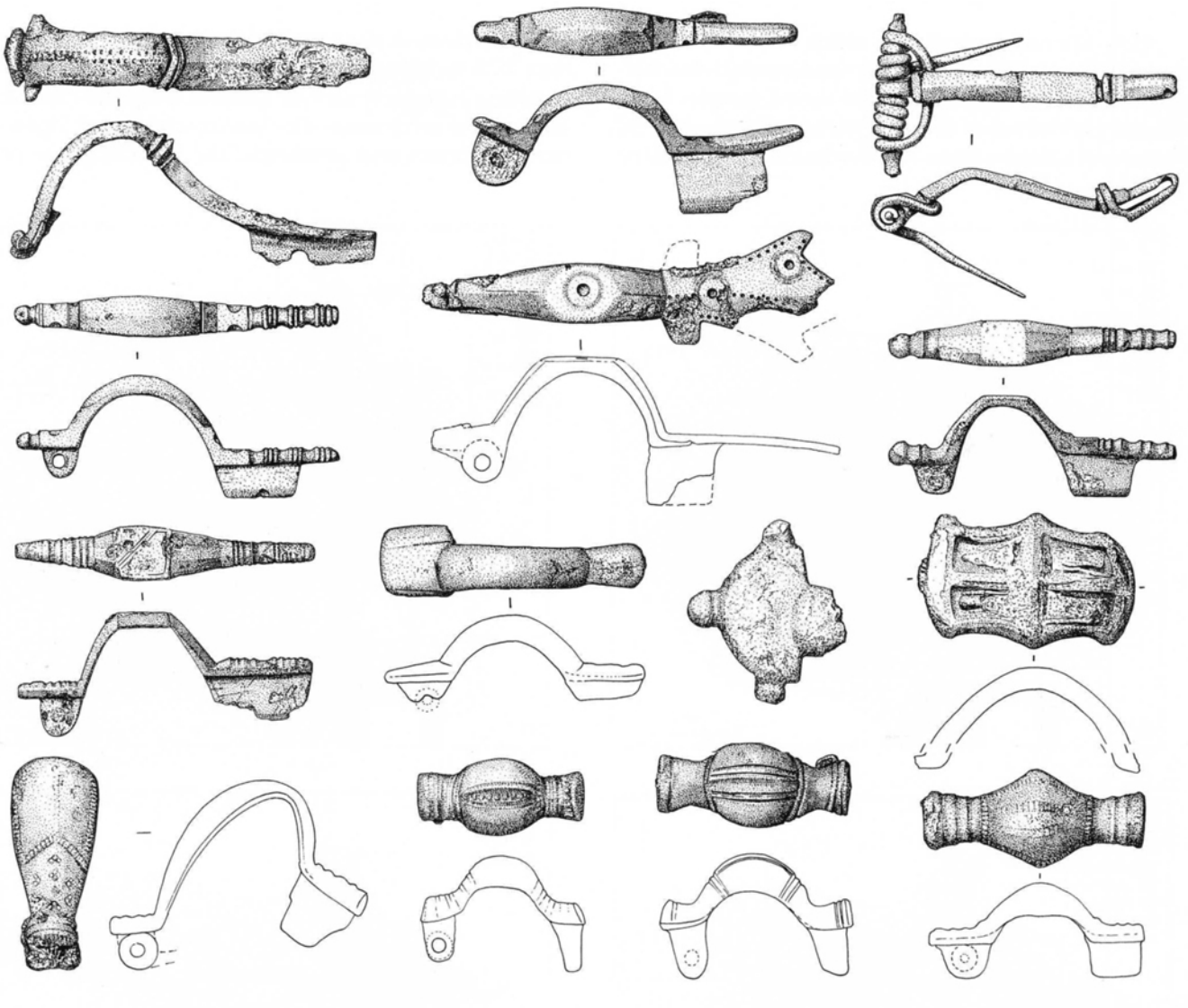

Fig. 10. Representative selection of fibulae found detector surveys on the settlement area at Sandegård. Scale 1:1. Drawings: M. Watt.

which are from the Roman Iron Age.

The trial investigations showed that the greater part of the preserved culture layer was formed during the Roman Iron Age. There may in places, however, especially within the central part of the settlement, still be preserved pits, structures (houses) and possibly also pockets with culture layers from later periods, but no large continuous areas of culture layer. The many finds from the Late Iron Age and the Viking Age, including pottery, therefore probably originate from ploughed-out settlement layers and structures (postholes and pits).

The finds. With almost 1000 surface and detector finds, Sandegård is one of the richest Iron Age settlement sites on Bornholm[17].

In addition to a number of coins and gold items which were recovered earlier, a further 23 gold finds (primarily hack gold), a stamp-decorated gold finger ring as well as 13 pieces of hack silver have been found during metal detector reconnaissance (Fig. 11). The coins found with a detector include four solidi, 30

[17] Find status at the end of 2000.

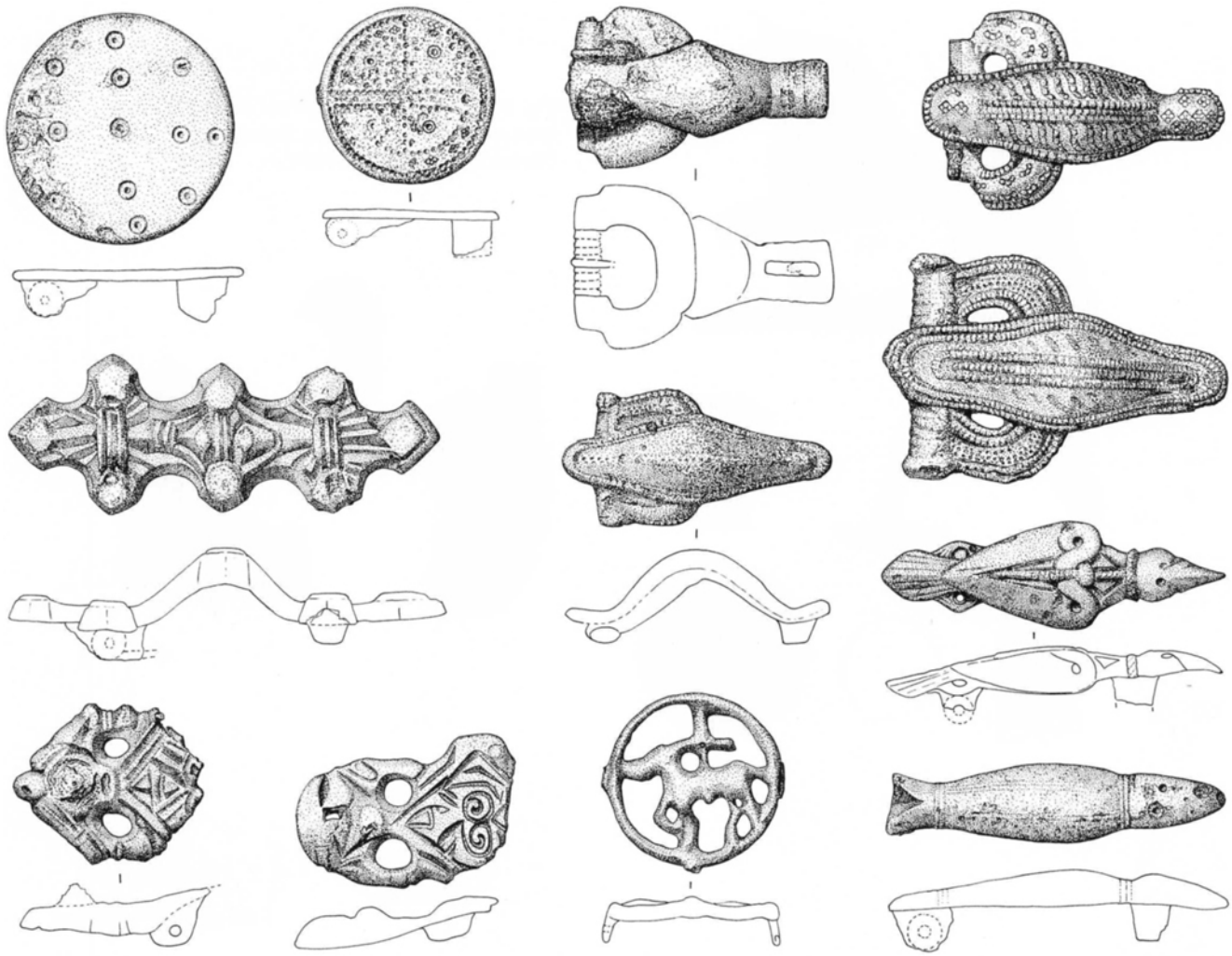

Fig. 10. Representative selection of fibulae found by detector surveys on the settlement area at Sandegård. Size 1:1. Drawings: M. Watt.

denarii, 18 dirhems, four coins of Viking Age type as well as 30 coins from the Middle Ages and the Renaissance.

With more than 150 specimens, fibulae are numerically the most dominant single artifact group (Fig. 10). Only a few can be dated to the Early Roman Iron Age, primarily from the transition from the Early to the Late Roman Iron Age. The more abundant fibulae from the Late Roman Iron Age also include some unfinished pieces, including types with turned foot (Fig. 17).

There is great variation of form in the fibulae from the Early Germanic Iron Age. In addition to various types of cross-bow fibulae there are also fragments of relief brooches (Fig. 10). As at other settlement sites the Late Germanic Iron Age is dominated by broad equal-armed and duck bill fibulae. Among the rarer types is a horse-shaped fibula of gilded bronze with inlaid garnets as well as fragments of disc-on-bow fibulae (Fig. 11).

Pendants of Late Germanic Iron Age and Viking Age types, including purse-shaped and open-worked pendants, as well as chain fasteners have been found at various places on the settlement site (Fig. 12).

Among the silver finds is a fragment of a kolben armring of solid silver, which is consistent with a date in the 5th century (Hansen 1995, 203). The majority of the other silver finds dates to the Viking Age. Included

Fig. 11. Selection of finds from the settlement area at Sandegård. Photo: Nationalmuseet (horse fibula). Others: M.Watt.

Fig. 12. Selection of pendants from the settlement area at Sandegård. Size 1:1. Drawings: M. Watt

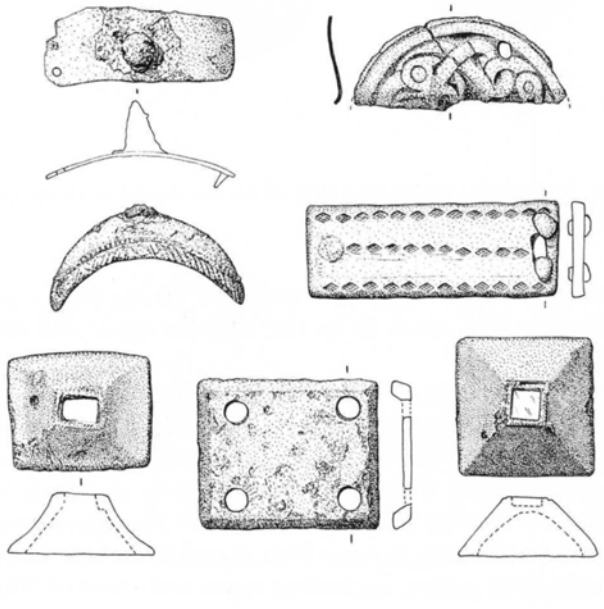

Fig. 13. Selection of belt and weapon fittings and a spur from the settlement area at Sandegård. Size 1:1. Drawings: M. Watt.

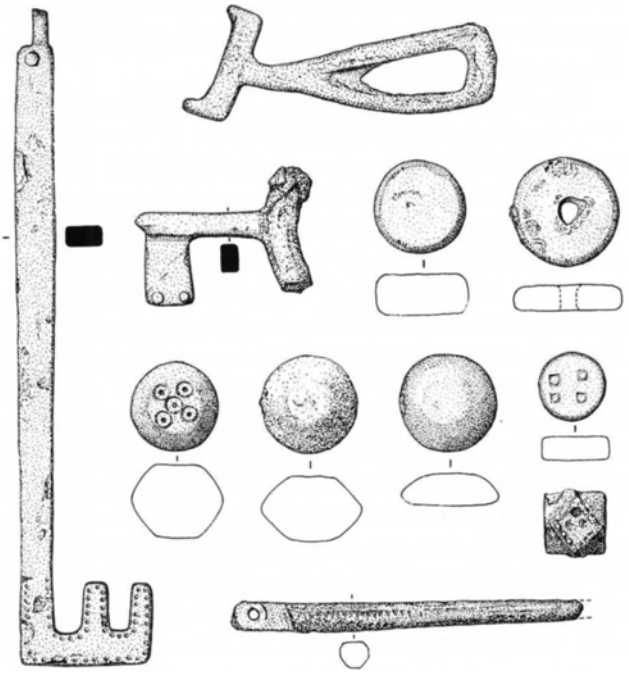

Fig. 14. Selection of keys and weights from the settlement area at Sandegård. Size 1:1. Drawings: M. Watt.

Fig. 15. Iron meat fork from the settlement area at Sandegård. Photo: Bornholms Museum

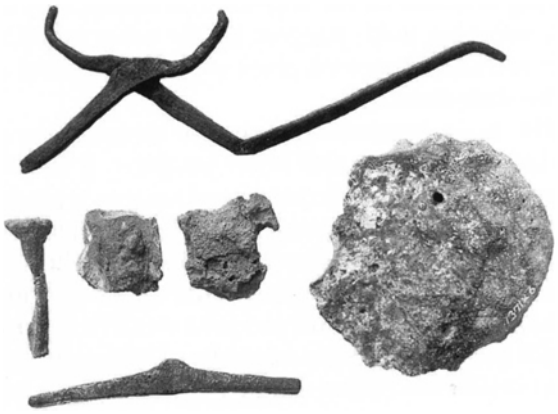

Fig. 16. Finds associated with craftsmanship from the settlement area at Sandegård. Hammer head, pair of crucible tongs, fragment of smelting crucible with melted bronze, dead head, casting residue (bronze) along with clay slags with adhering gold drops. Photo: M. Watt.

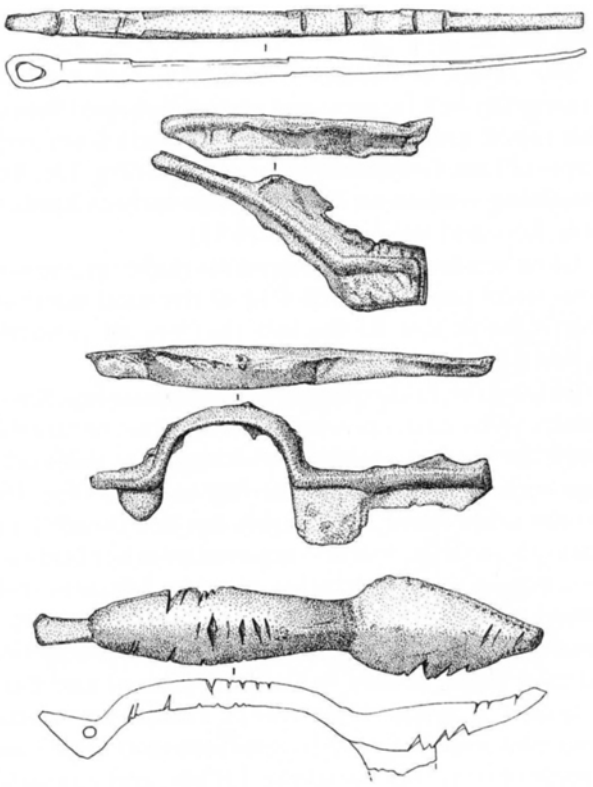

Fig. 17. Unfinished and miscast fibulae and a hacked-up bronze fibula (scrap metal) from the settlement area at Sandegård. Size 1:1 Drawings: M. Watt.

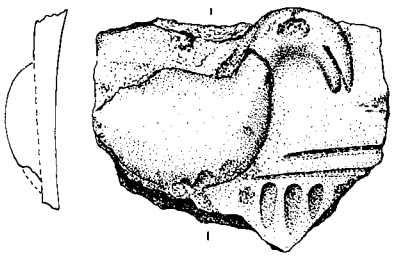

Fig. 18. Fragment of black-polished vessel with applied plastic figure of a bird. Size 1:1. Drawing:.M. Watt.

in these are a Thor's hammer, a spiral-shaped finger ring and a fragment of a trefoil stamp-decorated fitting, which has parallels in several hoards recovered recently from Bornholm (Fig. 11) (Watt 1996, 71ff., Figs. 25 and 27). Among the small finds, mention should be made of a fragment of a duck's foot pendant (Fig. 11), a type which is seen as being of eastern origin, and dated to the 11th-13th centuries (Müller-Wille 1989, 768ff and Fig. 15; Iversen & Näsman 1991, 49ff.).

The range of fittings is extensive and includes rectangular belt fittings, and pyramid-shaped fittings with inlaid garnets and decorative rivets from large lances of Late Germanic Iron Age type (Fig. 13). The remaining settlement finds include various kinds of tools, keys and weights (Figs. 14-15).

Glass beads and glass fragments make up a remarkably small proportion (3-4%) of the total material. This is partly due to the fact that not all privately-owned finds have been recorded.

Among the finds relating to craftsmanship, few of which can be dated precisely, is a small set of crucible tongs, the head of a goldsmith's hammer as well as clay slags with drops of gold adhering to them (Fig. 16). On the other hand, remarkably few deadheads from casting have been found compared to other find-rich sites, despite careful detector searches. Miscasts, unfinished and damaged fibulae as well as a fragment of a melting crucible suggest that jewellery production did take place, at least in the Late Roman and Early Germanic Iron Age (Figs. 16-17). Furthermore, slags from iron smelting as well as various iron ingots and clumps of iron (one weighing 1.2 kg), and a possible fragment of an iron-smelting furnace, have been found on the site.

The pottery from the site, which includes fragments of vessels of a high standard of craftsmanship (Fig. 18) spans the period from the Roman Iron Age to the Late Viking Age (Baltic ware).

Overall evaluation of the site. The trial investigation has, together with the distribution of detector and surface finds in the top soil, revealed that the Sandegård settlement site consists of two more-or-less contemporaneous settlements lying close to one another. The largest one (the eastern) has had a core area of at least 10 000 m^2 centred about 100 metres northeast of the present-day buildings of Sandegård. The rather smaller western settlement of about 3000 m^2 is centred about 120 metres north of the farm buildings. They each probably represent large stationary farm complexes, both with settlement continuity from the Roman Iron Age to the Viking Age. The find distribution maps (Fig. 9c,d) show that the greatest concentrations of finds, including nearly all the gold finds, correspond roughly to the two areas with markedly elevated phosphoric acid values. The trial corings suggest that the associated marginal or workshop areas with, among other things, various kinds of pits, covered large areas around the settlement core. The sieved samples in particular have demonstrated extensive smithing activity in the marginal areas which appear primarily to be associated with the settlement from the Roman Iron Age. The distribution of, for example, ingots of precious metals and bronze, a pair of crucible tongs as well as casting remains in the top-soil (including clay slags with adhering gold) suggest, on the other hand, that finer metalworking took place within the central area of the settlement site.

The main impression from the metal finds, particularly the fibulae and other jewellery, is that they represent a mixture of eastern and western types in all periods. Even though most of the finds are not significantly different from those which can be collected at other settlement sites on Bornholm, the proportion of high quality artefacts and precious metal from Sandegård is greater than at the majority of other settlement sites outside the Ibsker complex.

Ladegård, sb. 195, Klemensker parish[18]

The settlement site at Ladegård lies on a broad ridge close to the western edge of the town of Klemensker. From the site which is situated about 100 metres above sea level, the terrain falls sharply and opens up to give

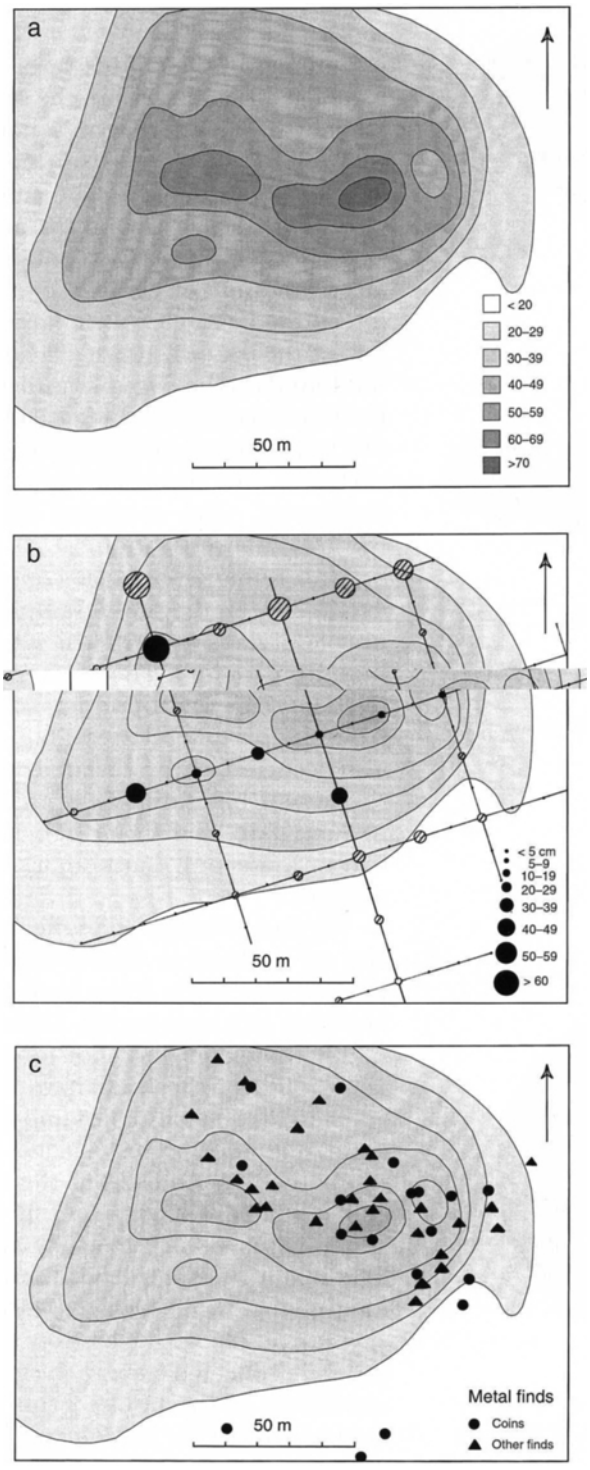

Fig. 19. The settlement area at Ladegård, sb. 195, Klemensker parish. Sampling programme 1999. (a) Phosphate map, (b) thickness of the culture layer, (c) coins and other finds from detector reconnaissance.

Fig. 20. Silver beads, hack silver and fragments of bronze jewellery from detector reconnaissance on the Viking Age settlement site at Ladegård. Photo: National Museum (disc), others M. Watt.

a broad view to the west over the Baltic Sea. The soil in the area consists of sandy clay in which the contours of a single large long house with curved walls can, in dry summers, be seen as growth differences in the crops.

The settlement site was first recorded in 1981 during registration of Klemensker parish[19]. Later the area was subjected to detector reconnaissance at regular intervals by amateur archaeologist Kaj Pedersen.

Sampling. During the extensive investigation in 1999, 100 phosphate samples were collected on a 40×40 metre network, covering an area of c. 25 000 m^2. The results of the analyses show that the phosphate content of the top-soil is elevated over an area of about 10 000 m^2 with a c. 100 metre long east-west orientated core area around the long house where the phosphate values are greatly elevated (Fig. 19a). Within the core area there is a marked agreement between the high phosphate values and finds in the top-soil. In contrast, there are no high phosphate values corresponding to a small group of finds collected 50-60 metres further

[18] Bornholms Museum journal number 891.

[19] The parish registration was carried out by Finn Ole Nielsen and Lisbeth Pedersen in collaboration with, among others, amateur archaeologist Gert Møller Larsen.

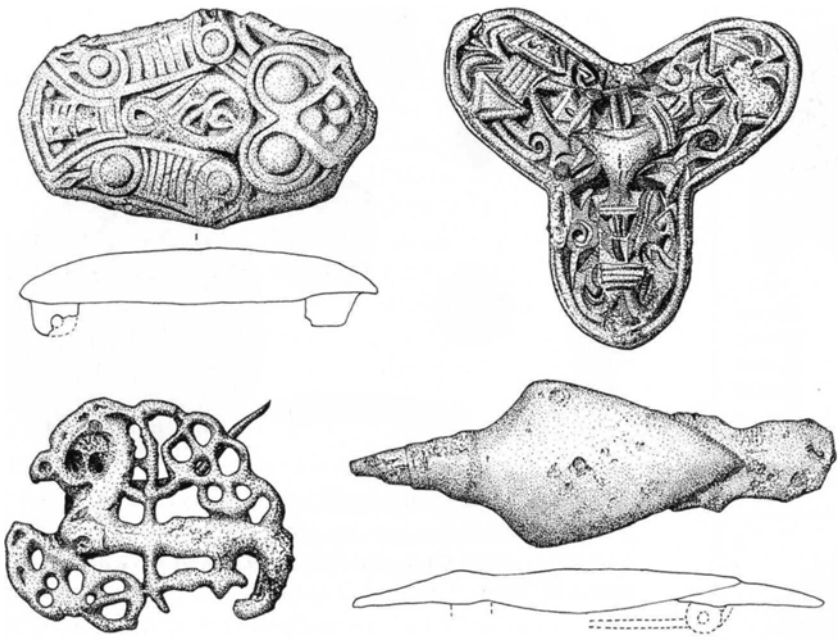

Fig. 21. Selected fibulae from Ladegård, found by detector reconnaissance. Size 1:1. Drawings: M.Watt.

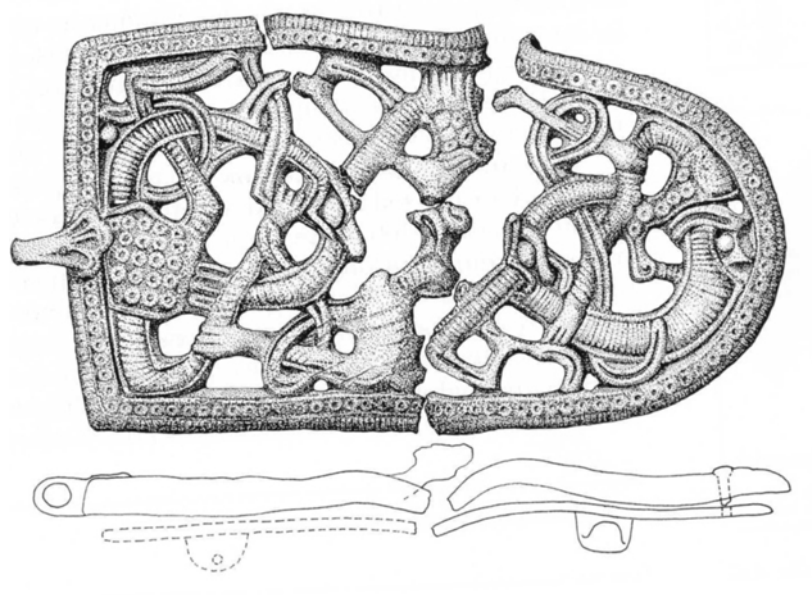

Fig. 22. Fragments of an open-work tongue-shaped brooch from Ladegård. Size 1:1. Drawing: M. Watt.

south.

Samples of the culture layer, collected at 30 points within the settlement area, showed that only modest remains of the actual settlement layers are preserved in the central part (Fig. 19b). In contrast, a (redeposited?) culture layer containing large amounts of burnt clay daub, interpreted as a clearance layer following the burning down of a house, was found on the edge of a gulley on the northern side of the settlement. Old vegetation layers and cultivation surfaces, with scattered settlement indicators, were recorded within the area of investigation.

Most remarkable is the common occurrence in the sieved samples of burnt out slags, a few of which had a high iron content. The greater part of these slags was found in samples from the peripheral areas, but they also occurred within the area where the actual habitation is presumed to have lain. Smithing debris, in contrast, was only found in a single sample.

The finds. Compared to the majority of settlement sites from this period, the finds from Ladegård are both rich and varied. Unfortunately the exact find spot for only about 30% of the finds have been recorded (primarily coins and hack silver) (Fig. 19c).

Of the 175 finds from the topsoil, five are dirhems and 15 are silver coins of 11th century type. The majority comes from the area around the long-house, whereas several pieces of hack silver (Fig. 20) were collected close to the gulley northwest of the house. From the central part of the settlement there are a number of fibulae, fragments of jewellery and fittings, of which a few date to the end of the Late Germanic Iron Age, and the remainder are from the Viking Age and the Early

Fig.23. Box-shaped brooch and an animal-head brooch of Gotlandic type, found by detector reconnaissance at Ladegård (right) and Hjulmagergård (note 20). Both brooches are filled with lead and could have had a secondary function as smelting cruibles. Photo: Bornholm Museum.

Middle Ages (Figs. 20-24). Among the Viking Age finds, mention can be made of fragments of a large tongue-shaped, openwork brooch ornamented in profile animal style (Jelling style)(Fig. 22), dating from the first half of the 10th century (Jan Petersen 1928, no. 137; Skibsted-Klæsøe 1999, 120). A Gotlandic box-shaped brooch which, like the animal-head brooch from a contemporaneous settlement at Hjulmagergård,

Fig. 24. Bronze arm ring, ornamented bronze foil and knife fitting from Ladegård. Size: 1:1. Drawing: M. Watt.

Åker parish, is filled with lead and may have been reused as a crucible (Fig. 23)[20].

Several tools and fragments of weapons and horse harness, weights of iron-core type and lead, a bolt lock, keys, spindle-whorls (or mane beads) of lead, fragments of bronze vessels as well as rotary hand querns of mica schist have also been found within the settlement area. According to information from amateur archaeologist Gert Møller Larsen (1989) a large number of iron artefacts (not mapped), including many lumps of pig iron and small ingots, have been retrieved particularly from the eastern part of the site.

The pottery collected on the surface is of Late Slavic, primarily Menkendorf type, while occasional sherds belong to vessels thrown on a rapidly rotating potter's wheel.

Overall evaluation of the settlement site. Apart from the sporadic finds of Roman Iron Age pottery in occasional sieved samples from the western margin of the area, there is nothing to suggest that there was habitation of significance at the site prior to the Late Germanic Iron Age. Several finds, including the thrown pottery, show that the site was in use at least until some time in the 13th century, when the settlement is presumed to have been moved to the site of the present day Ladegård.

As there are only very few finds from the settlement area from the High Middle Ages and the Renaissance, it is probable that most of the many iron artefacts retrieved from the top-soil, which are difficult to date, belong to the time when the site was in use (about 700-1200).

In the light of the unusual abundance and variation of finds (including weapons) and the evidence for ironworking, concentrated around a large long-house, it is tempting to identify the Viking Age Ladegård settlement with one of Bornholm's early royal manors. According to the Knytlinge Saga, among others, these are said to have existed already by the end of the 11th century, when Bornholm finally became part of the Danish kingdom.

[20] Detector find from Hjulmagergård, sb. 242. Bornholms Museum journal number 2146x1.

Conclusions

Through an extensive sampling programme at 31 find-rich Iron Age and Viking Age sites with preserved culture layers, it has been demonstrated, with the aid of selected examples, that for relatively modest expenditure it is possible to gain an overview of the size, primary structure and state of preservation of the settlements.

Together with analyses of detector and surface finds, the trial investigations have shown that at the great majority of settlement sites today ploughing has penetrated into layers from the Roman Iron Age, but pockets of preserved culture layer and structures with associated finds (postholes, pits) from later periods can be found in many places. Core samples have revealed that marginal areas still contain important information that can elucidate the economic foundations of the settlements.

The degree to which the settlements have been ploughed out, compared with the dating profiles, strengthens the suspicion that tremendous cultivation pressure has resulted in the destruction of primary settlement layers. Thus the majority of finds from the Late Iron Age and the Viking Age have today been ploughed up. It is therefore important that efforts are made to ensure that the finds are retrieved and that the registration of information in connection with surface and detector reconnaissance is of an acceptable quality.

The results of the trial investigations, together with analyses of the artifacts found by detector and surface reconnaissance have revealed a clear relationship between different settlement types and characteristic find and dating profiles. An understanding of the retrieval technique, studies of deviations and repetition patterns in the representation of the types gives an impression of local types and standard inventories from different periods. This can supplement and enrich the basic knowledge of the Iron Age society which has been gained, particularly in recent years, through the study of graves (Ørsnes 1966; Nielsen 1987; Becker 1990; Jørgensen 1988; Jørgensen 1990; Jørgensen & Jørgensen 1997; Jørgensen 1999).

Seen in a broader perspective, the detector sites on Bornholm are important because they lie in immediate geographical contact with the grave finds. Whereas the grave finds reflect a conscious exhibition of the deceased's social status, the diverse detector finds represent uncensored daily life.

If the development is followed chronologically, it can be established that settlements on Bornholm, both in the Roman and the Germanic Iron Ages, comprise both large and small units. The extensive sampling programme and find analyses have shown that many of the large black-earth sites were already established by the end of the Pre-Roman Iron Age. This certainly applies to the settlements around Sorte Muld (the Ibsker complex). With at least 25 more-or-less continuous settlement sites, the Ibsker complex developed, in the course of the Late Roman and Early Germanic Iron Age, into the largest and, without doubt, the most important economic and political centre on Bornholm. It was from here that developments on the island were controlled in the 5th-8th centuries .

Iron smelting has been documented by traditional investigations as early as the Pre-Roman Iron Age (Voss 1991, 172) and the frequent occurrence of smithing debris in the sieved samples, primarily from the preserved Roman Iron Age layers, show that working of iron took place locally at the individual sites.

In the course of the Late Roman Iron Age and the beginning of the Early Germanic Iron Age the number of finds increases at almost all the large settlement sites. At the same time, the differences between the dark-coloured and find-rich central areas of the sites, which comprise one or more farm complexes, become clearer relative to the marginal areas. The underlying settlement layers with overlapping and closely-spaced remains of buildings, which characterise central areas of the black-earth sites' show that building renewal in the Late Iron Age normally took place within the same restricted area.

The connection between the dark-coloured central areas with high phosphate values and finds of precious metals (including coins), jewellery and glass is striking throughout the whole of the Late Iron Age. Miscast and unfinished fibulae and metal stamps show that the finer metal craftsmanship probably took place within the central area of most of the large settlement sites in both the Late Roman Iron Age and the Germanic Iron Age. Conversely, no certain evidence has yet been documented from the settlements on Bornholm for jewellery production which can be dated to the Viking Age.

The marked increase in the number of finds, not just within the Ibsker complex, but at most of the find-rich settlement sites, appears to occur at the same time as the large Roman Iron Age cemeteries are

abandoned at the end of the Late Roman Iron Age (Jørgensen 1990, 86). However, the degree to which these developments are due to chance or may reflect changes in circumstances relating to ownership and inheritance, as suggested by Lars Jørgensen on the basis of studies of the grave finds, requires a more detailed analysis of the settlement material.

The fact that some of the settlement sites developed in the course of the Germanic Iron Age into central sites comprising several individual contemporaneous settlements reflects without doubt the general hierarchical structure of the society with roots in the Merovingian area. This is also suggested by Lars Jørgensen and Anne Nørgård Jørgensen on the basis of the rich grave finds (Jørgensen & Jørgensen 1997, 111ff.). The distance of several kilometres between the largest settlement sites (of the Sandegård type) suggests that each could have controlled a hinterland with smaller settlements.

We can provisionally surmise on how the power structures between the Ibsker complex and the other larger settlement sites developed in the course of the Late Iron Age. The amount of prestige finds, primarily precious metals and glass, from the largest settlement sites outside Ibsker (e.g. Sandegård, Møllegård, Agerbygård) suggests that the chieftain families elsewhere on the island tried to establish themselves as competitors to the Ibsker complex in the course of the Late Iron Age. The dominance of late finds in the dating profiles from these very sites suggests that they outlived the Ibsker complex.

From the end of the Late Germanic Iron Age and in the subsequent centuries a large number of new settlements were established, which in the majority of cases can be perceived as single farms represented here by Ladegård. A preliminary analysis of the metal finds from the sites, which are dominated by the easily recognisable Baltic ware, shows that more sites than previously imagined were already established in the 9th and 10th centuries (Watt 1988). The more than 300 localities which so far represent this rapidly growing settlement category illustrate a settlement pattern which is reminiscent of that from historical times (most recently Nielsen 1994; Wagnkilde 1999, Fig. 1).

In the course of the Iron Age and the Viking Age Bornholm had links with different cultural regions. The rich find material which is the result of many years of collaboration between local detector amateurs and professional archaeologists, will without doubt be important also in the future both for understanding the political development in the Baltic region and for the testing of various social structural models (e.g. Näsman 1998).

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References

Becker, Carl Johan 1975: Hovedlinier i Bornholms Oldtidshistorie. *Bornholmske Samlinger* 1975.

Becker, Carl Johan 1990: *Nørre Sandegård. Arkæologiske undersøgelser på Bornholm 1948-1952.* Det Kongelige Danske Videnskabernes Selskab. Historisk-Filosofiske Skrifter 13.

Callmer, Johan 1999: Vikingetidens likarmade spännen. In: Hårdh, Birgitta (ed.): *Fynden i centrum. Keramik, glass och metall från Uppåkra.* Acta Archaeologica Lundensia Series in 8°, No. 30, pp. 201-20.

Hansen, Ulla Lund *et al.* 1995: *Himlingøje - Seeland - Europa.* Nordiske Fortidsminder Ser. B, Bd. 13.

Hartmann, Niels 1984: Spottest fosfatanalyse. *Arkæologisk felthåndbog* 1984. København, Nationalmuseet.

Hartmann, Niels 1991: Fosfatanalyse og dens anvendelse som alternativ recognosceringsmetode. *Arkæologiske udgravninger i Danmark* 1990, pp. 39-46.

Hårdh, Birgitta 1999: Näbbfibulan - ett vendeltida vardagsspänna. In: Hårdh, Birgitta (ed.): *Fynden i centrum. Keramik, glass och metall från Uppåkra.* Acta Archaeologica Lundensia Series in 8°, No. 30, pp. 145-62.

Iversen, Mette & Näsman, Ulf 1991: Mammengravens indhold. In: Iversen, Mette (ed.): *Mammen. Grav, kunst og samfund i vikingetid.* Jysk Arkæologisk Selskabs Skrifter XXVIII.

Jørgensen, Anne Nørgård 1999: *Waffen und Gräber. Typologische und Chronologische Studien zu skandinavischen Waffengräbern 520/30 bis 900 n.Chr.* Nordiske Fortidsminder Serie B,Bd. 17.

Jørgensen Lars 1988: Family burial practises and inheritance systems. The development of an Iron Age society from 500 BC to AD 1000 on Bornholm. *Acta Archaeologica 58,* 1987, 17-53.

Jørgensen, Lars 1990: *Bækkegård and Glasergård.* Arkæologiske Studier Vol. 8.

Jørgensen, Lars 1994: The find material from the settlement of Gudme II - Composition and interpretation. In: The Archaeology of Gudme and Lundeborg. *Arkæologiske Studier.* Vol. 10, 1993, pp. 53-63.

Jørgensen, Lars 1999: Fra nutidens pløjelag til jernalderens samfund - stormænd og håndværkere i Gudme. *Årbog for Svendborg & Omegns Museum* 1998, pp. 8-21. Svendborg.

Jørgensen, Lars & Jørgensen, Anne Nørgård 1997: Nørre Sandegård Vest. *A cemetry from the 6th-8th centuries on Bornholm.* Nordiske Fortidsminder Serie B, Bd.14.

Jørgensen, Lars, Nielsen, Finn Ole & Sørensen, Palle Ø. 1993: Jordbundsanalyse og forhistorisk bosættelse. *Arkæologiske udgravninger i Danmark,* 1992, pp. 21-27.

Jørgensen, Lars & Pedersen, Lisbeth 1996: Vikinger ved Tissø. Gamle og nye fund fra et handels- og håndværkscenter. *Nationalmuseets Arbejdsmark* 1996.

Klindt-Jensen, Ole 1957: *Bornholm i folkevandringstiden og forudsætningerne i tidlig jernalder.* Nationalmuseets Skrifter. Større Beretninger II. København.

Kromann, Anne & Watt, Margrethe 1984: Skattefundet fra Smørenge. En nedgravet skat fra folkevandringstid på Bornholm. *Nationalmuseets Arbejdsmark 1984,* pp. 29-41.

Müller-Wille, Michael 1989: Fremdgut und Import östlicher Provenienz in Schleswig-Holstein (9.-12. Jahrhundert). *Bericht der Römisch-Germanische Kommission* 69, 1988.

Näsman, Ulf 1998: Sydskandinavisk samhällsstruktur i ljuset av merovingisk och anglosaxisk analogi eller i hvad er det som centralplatserna er centrala? In: Lars Larsson & Birgitta Hårdh (eds.), *Centrala Platser - Centrala Frågor. Samhällstrukturen under järnåldern,* Uppåkrastudier 1. Acta Archaologica Lundensia Series in 8°, No. 28, pp. 1-26.

Nielsen, Finn Ole Sonne 1982: Bopladsen ved Bækkegård i Østerlars. *Fra Bornholms Museum 1981,* 37-40.

Nielsen, Finn Ole 1994: Middelaldergårde på Bornholm. *Hikuin* 21, 125-138.

Nielsen, Henning 1997: Et regionalt rigdomscenter i Sydvestsjælland. In: Callmer, J & Rosengren, E. (eds.) *"... gick Grendel at söka höga huset ...". Arkeologiska källor till aristokratiska miljöer i Skandinavien under yngre järnålder.* Hallands Länsmuseers Skriftserie No 9/GOTARC Serie C. Arkeologiska Skrifter No 17, pp. 55-70.

Nielsen, Karen Høilund 1987: Zur Chronologie der jüngeren germanischen Eisenzeit auf Bornholm. Untersuchungen zu Schmuckgarnituren. *Acta Archaeologica 57,* 1986, 47-86.

Paulsson, Jonas 1999: Metalldetektering och Uppåkra. Att förhålla sig til ett detektormaterial. In: Hårdh, Birgitta (ed.): *Fynden i centrum. Uppåkrastudier 2.* Acta Archaeologica Lundensia Series in 8°, no. 30, pp. 41-58.

Persson, Kjell 1996: Phosphate test strips. A new equipment for direct soil-phosphate field analysis. *Laborativ Arkeologi* 9, pp. 57-60.

Petersen, Jan 1928: *Vikingetidens smykker.* Bergen.

Skibsted-Klæsøe, Iben 1999: Vikingetidens kronologi - en nybearbejdning af det arkæologiske materiale. *Aarbøger for Nordisk Oldkyndighed og Historie 1997,* pp. 89-142.

Vedel, Emil 1886: *Bornholms Oldtidsminder og Oldsager.* København, C.E.C. Gad.

Voss, Olfert 1991: Jernproduktion i Danmark i perioden 0-550 e.Kr. In: Charlotte Fabech & Jytte Ringtved (eds.): *Samfundsorganisation og regional variation. Norden i romersk jernalder og folkevandringstid.* Jysk Arkæologisk Selskabs Skrifter XXVII, 171-82.

Wagnkilde, Hanne 1999: Slaviske træk i bornholmske grave fra tiden omkring kristendommens indførelse. *Meta* 2, pp. 3-19.

Watt, Margrethe 1983: A Viking Age Settlement at Runegård (Grødby), Bornholm. An Interim Report of the Investigations 1979-82. *Journal of Danish Archaeology,* Vol. 2, pp. 137-148.

Watt, Margrethe 1988: *Bornholm mellem vikingetid og middelalder.* In: Festskrift til Olaf Olsen, 105-122. København. Det Kongelige Nordiske Oldskriftselskab.

Watt, Margrethe 1991: Sorte Muld. Høvdingesæde og kultcentrum fra Bornholms yngre jernalder. In: P. Mortensen & B.M. Rasmussen (eds.): *Fra Stamme til Stat i Danmark 2.* Jysk Arkæologisk Selskabs Skrifter XXII:2, pp. 89-106.

Watt, Margrethe 1996: Det antikvariske arbejde. *Fra Bornholms Museum 1994-95,* pp. 49-80.

Watt, Margrethe 1997: Overfladerecognoscering af jernalderbopladser. Nogle kildekritiske betragtninger over samarbejdet mellem arkæologer og detektoramatører. In: Callmer, J. & Rosengren, E. *"... gick Grendel at söka höga huset ...". Arkeologiska källor till aristokratiska miljöer i Skandinavien under yngre järnålder.* Hallands Länsmuseers Skriftserie No 9/GOTARC Serie C. Arkeologiska Skrifter No 17, pp. 131-143.

Watt, Margrethe 1998: Bopladser med Kulturlag - deres betydning for studiet af bosættelsesmønstre og "centerdannelse". In: Lars Larsson & Birgitta Hårdh (eds.), *Centrala Platser - Centrala Frågor. Samhällstrukturen under järnålders.* Uppåkrastudier 1. Acta Archaologica Lundensia Series in 8°, No. 28, pp. 205-16.

Watt, Margrethe 2000: Detektorfund fra Bornholmske bopladser med kulturlag - Repræsentativitet og metode.

Skrifter fra Odense Bys Museer Vol.5, 79-97.

Watt, Margrethe (in prep.): Sorte Muld - guldgubberne og Ibskerbygden.

Zimmermann, Haio 1992: *Die Siedlungen des 1. bis 6. Jahrhunderts nach Christus von Flögeln-Eekhöltjen, Niedersachsen.* Probleme der Küstenforschung im Südlichen Nordseegebiet 19.

Ørsnes, Mogens 1966: *Form og stil i Sydskandinaviens yngre germanske jernalder.* Nationalmuseets Skrifter. Arkæologisk-Historisk række XI. København.

Östergren, Majvor 1989: *Mellan stengrund och stenhus.* Theses and Papers in Archaeology 2. Visby.

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Hørup - a specialised workshop site from the Roman Iron Age and Early Migration Period on Zealand

by Søren A. Sørensen

Introduction

During the last 10-15 years many new Iron Age sites have turned up in Denmark in the wake of the very extensive use of metal detectors by amateur archaeologists. This situation has, however, also given museums the opportunity of pointing out to these amateur archaeologists known sites with a potential for interesting finds where the museums themselves have not had the resources to carry out the often very time consuming metal detector surveys. Hørup is just such a site. It has been known since the end of the 1950s, when a local amateur archaeologist carried out a small excavation. The main products of this excavation were large quantities of bones and an amount of pottery dating from the transition between the Pre-Roman and Early Roman Iron Age (Liversage 1980). The farmer who cultivated the land on which the site lies has picked up artefacts from time to time and in 1970 he found a bronze finger ring that was handed in to the National Museum. Otherwise the finds, which mostly comprise pottery, remained in his private collection. In 1992 the museum Færgegården visited the site and it was then discovered that dense occurrences of culture layer containing pottery, bones and burnt stones had been ploughed up. This prompted the museum to initiate a systematic metal detector survey of the site, a task that was carried out over a period of four years by a local amateur archaeologist. Archaeological excavations extending over three seasons followed up this survey, but so far only a limited part of the preserved culture layer has been investigated.

The locality has its name from the small village of Hørup, which lies between Frederikssund and Slangerup in Northern Zealand (Fig. 1). The site itself lies on an even, southwest-facing slope about 500 m southeast of the village. To the south, there is a damp area of water meadow and bog that is drained via a stream, the Græse, which runs into Roskilde Fjord 5 km west of the site (Fig. 2).

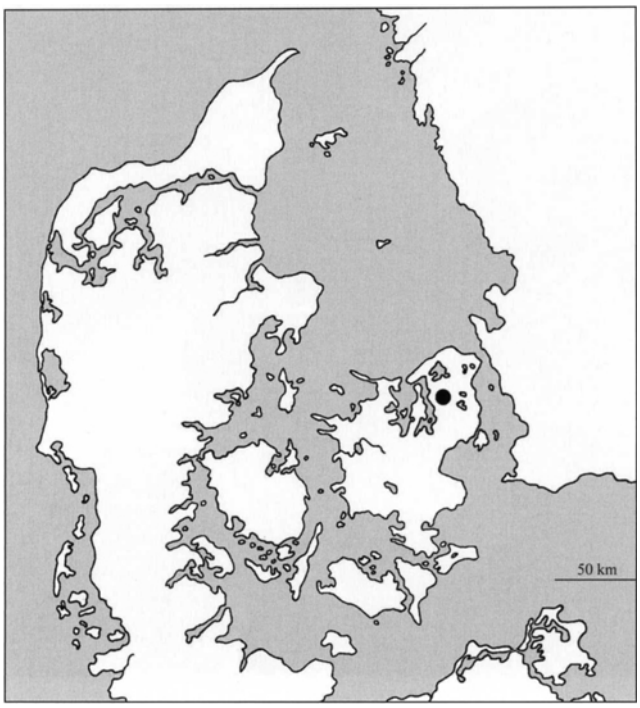

Fig. 1. The location of the specialised workshop at Hørup.

The metal detector finds

The metal detector survey quickly gave results and even now, seven years later, new finds are still turning up, although their number has decreased significantly with time. Some of the metal detector finds have been plotted in relative to two points in the property boundary, which delimits the site to the west. These plots, along with observations made at the site, show that the find intensity is greatest within an area of about 75 x 75 m, but that the whole find area has an extent of about 20 000 m^2.

Among the identifiable metal detector finds, fibulae and fragments of these are the most common artefact type with a total of about 50 specimens (Fig. 3). These fibulae give an approximate time span for the site. The earliest fibulae date from the Early Roman Iron Age, phase B2, and the latest are from the Early Germanic Iron Age (Fig. 4). In other words, there was intensive activity at the site for about 350 years. Other finds suggest that the site may have started even earlier. For example, as mentioned above, Liversage dates the pottery from Hørup to the transition between the Pre-Roman and the Early Roman Iron Age (Liversage 1980). Metal artefacts are, however, first a significant presence from the Early Roman Iron Age and the site seems to have been at its height in the Late Roman Iron Age. Some of the fibulae from the earliest horizon indicate contacts with East German and Polish areas; examples include a Prussian variant of an eye fibula and several spiral-cased fibulae. There are, however, also fibulae, which must be presumed to be of domestic, possibly local, origin. The latter are one-sectioned fibulae with broad strap-shaped bows. On four of these there are remains of soldered-on thin silver foil on the bow and on a further two there are traces of the soldering metal, which suggests that they too have been clad with silver. The silver cladding here was decorated with various geometric designs such as herringbone patterns and circles.

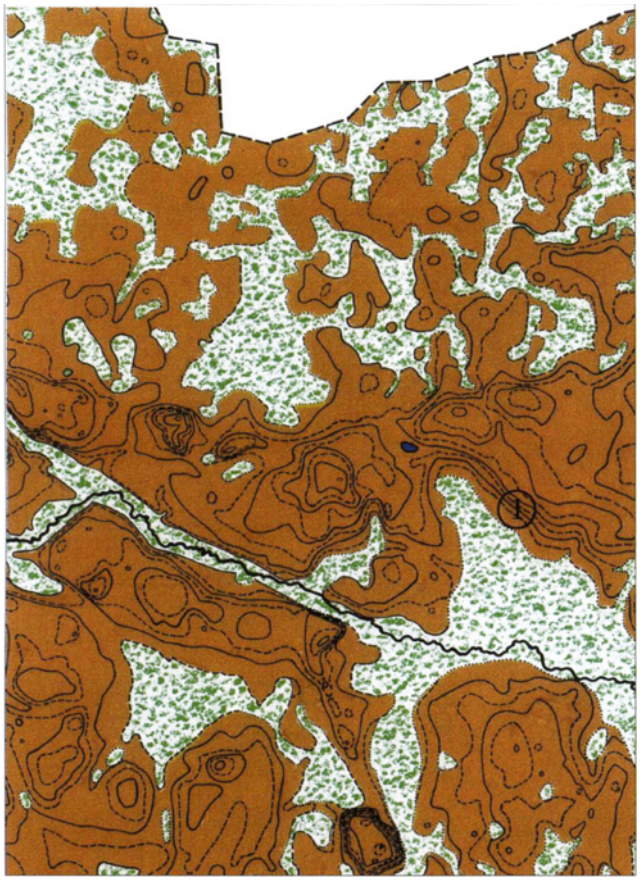

Fig. 2. Topographical map showing the landscape around Hørup (1).

It has not been possible to demonstrate the same foreign contacts in the later fibulae, with the exception of a single example whose place of origin should probably be sought in the area of the Elbe and a provincial Roman enamelled disc-shaped brooch. It is a characteristic of the Late Roman Iron Age fibulae that they all, without exception, have a fixed foot. Not one has a turned foot, a feature that is otherwise common in surrounding areas. The latest fibulae from the site, from C3 and the Early Germanic Iron Age, are remarkable in that they are all in the form of fragments – most commonly comprising just the foot and possibly a little of the bow. This should perhaps be interpreted as they represent scrap metal from fibulae and intended to be melted down.

The fibulae provide a good dating framework for activities at the site, i.e. from the Early Roman Iron Age B2 until the Early Germanic Iron Age. There are no finds, which can be dated to the Late Germanic Iron Age, but there are, however, two finds from the Viking Age - a weight with flattened poles and the arm from a set of scales. There is, though, nothing to suggest that the site continued uninterrupted up into Viking times. The two Viking Age finds must be presumed to come from separate and independent settlement of a more modest character. All the other metal finds from the site fit very well into the dating frame provided by the fibulae (Fig. 5).

Fig. 3. A small selction of brooches from the site. All but one found by metal detector. Scale ca. 1:2.

Apart from the fibulae, no artefact groups among the metal detector finds are represented by more than a few examples. On the other hand, the range of types from the site is wide and varied. In the following the most important metal detector finds will briefly be mentioned:

A bi-conical gold breloque from which the loop is missing. This is, as yet, the only gold artefact found at the site.

Nine coins have been recovered; the earliest is a large bronze coin, a sesterce, minted under Hadrian (Sabina) (117-136 AD) (Fig. 6). This is followed by seven denarii, three Antonius Pius (138-161 AD), one Faustina I (140-161 AD), two Commodus (180-192 AD), and finally one unidentifiable specimen. The last coin is a siliqua, also with a broken loop; it was minted under Valentinian I (364-367 AD)[1].

A small piece of silver foil with riveted-on chequered gold foil comes from the mount at the mouth of a sword scabbard (Fig. 7). The fragment has been compared with the scabbard mounts from a magnificent scabbard found in Nydam Bog[2], and the pieces are so very similar that they must be presumed to have originated from the same workshop. The piece can be dated to the Late Roman Iron Age C3.

This small fragment of scabbard mount is not the only weapon find from the site. Other parts of swords and sword scabbards include a cast bronze pommel which terminates in two animal heads (Fig. 8), a U-

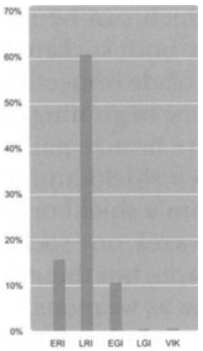

Fig. 4. The relative distribution of the fibulae from Hørup. ERI - Early Roman Iron Age, LRI - Late Roman Iron Age, EGI - Early Germanis Iron Age, LGI - Late Germanic Iron Age, VIK - Viking Period.

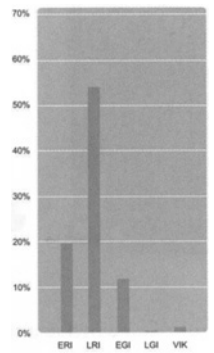

Fig. 5. The Relative distribution of all finds.

[1] All the identifications of the coins were carried out by the Royal Collection of Coins and Medals at the National Museum, and museum curator Helle Horsnæs is thanked for the information.

[2] Thanks to museum curator Flemming Rieck, the National Museum's Centre for Maritime Archaeology, for permission to carry out a detailed comparison with the artefacts from Nydam Bog.

Fig. 6. One roman bronze sesterce and two silver denarii. Scale ca. 1:1.

Fig. 8. Cast bronze pommel from the final phase of the site, 5th century AD. Scale 1:1.

shaped bronze ferrule and an animal-shaped bronze foil mount which originally has been pelta-shaped and has been affixed lowermost on the scabbard of a sword. The latter is decorated with punched ornamentation in Sösdala style and dates from the Early Germanic Iron Age. Finally, there is a small strap end mount, which, according to observations made on the Illerup material, comes from a sword set.

Other weapons which can be mentioned include two iron arrowheads, both socketed, but with a leaf-shaped and a narrow blade respectively. There is also a short iron spur from the beginning of the Late Roman Iron Age. A decorative bronze nail with a silver covering is possibly from a shield and a bronze edge fitting comes either from a shield or a sword scabbard. Finally, there are two axes, one socketed axe, and one broken. Both are of iron, but these could equally well be ordinary work axes as weapons.

A circular bowl-shaped silver button decorated with gilt spiral carving and niello probably comes from a magnificent buckle similar to finds from Nydam II and Ejsbøl (Ørsnes 1988, Taf. 57). Among other more simple buckles mention must be made of a small bronze example with a triangular anchor plate. Both buckles date from the Early Germanic Iron Age.

Small personal items include four bronze sewing/darning needles, a bronze bead, a bronze spindle whorl, an ear-pick with a spiral handle and a loop, a strap end mount, a hairpin with a rhomboid head, a bull-headed mount for a drinking horn, a couple of finger rings, mounts from knives and, finally, a bronze key. All of these artefacts can be dated to within the time span given by the fibulae.

With regard to artefacts linked with workshop activities, mention can be made of seven lead or bronze weights, in addition to the Viking Age weight already mentioned (Fig. 9). The weights are predominantly tablet-shaped; some of them are equipped with vary-

Fig. 7. The small fragment of a sword scabbard mount to the right is from Hørup. The intact mount to the lesft was found in Nydam Bog. Scale ca. 1:1.

Fig. 9. Three of seven weights from Hørup. Two of bronze and one of lead. Scale ca. 2:1.

ing numbers of circular impressions, whereas others are blank. There are iron knives of various sizes – from very small, with a blade length of around 4 cm, to large knives with a blade length of over 20 cm. A leatherworker's/shoemaker's knife with a semi-circular blade and the tang located on the central axis was also found, along with two iron chisels. There are also various waste products from bronze casting and bronze working; lumps of melted bronze, wholly or partially cut-up bronze ingots, hammered-out bronze items, cut-up sheet bronze work (a vessel?) and sheet bronze with rivets, possibly all refuse from a tinker.

Over and above this is a series of more-or-less unidentifiable small artefacts and fragments of bronze, which should possibly be interpreted as bronze scrap. This includes an almost completely melted down bronze fibula, showing that fibulae were melted down at the site. Accordingly, it was assumed, in advance of the excavation, that workshop activity had taken place at the site. This assumption was based not only on the artefacts found by metal detector but also on a series of finds and observations made during reconnaissance of the field. The ploughed-up culture layer contained abundant slag and cattle horn cores with saw marks, both of which indicate the presence of workshop activities.

The excavation

The intensive detector survey of the field enabled an impression to be gained of where the concentration of finds was greatest. It was here that the first trial trenches and the first small excavation field were laid out in 1994. A 25 m long trial trench, supplemented by core sampling, showed that the culture layer was, in some places, more than 1 m thick. In the culture layer there were dense occurrences of red-fired clay, concentrations of fire-shattered stones, accumulations of refuse from a bone worker and a bronze caster as well as many scattered single finds. Surprisingly, there were relatively few metal finds, in comparison with the many metal detector finds from the field. This is often seen with metal detector sites when an archaeological excavation is subsequently instigated. The author has carried out a small calculation to demonstrate the actual relationship between metal finds resulting from the metal detector surveys and corresponding finds resulting from the excavation. To date, about 2 000 m^2 of the site has been uncovered (Fig. 10). Judging from the distribution of the metal detector finds and the colour of the earth in the plough soil, the site is estimated to extend over an area of c. 20 000 m^2, i.e. at most 10% of the site has so far been exposed. Of the exposed area, only a part corresponding to about 150 m^3 has been excavated and riddled. This figure should be compared with the calculated volume of the culture layer for the whole site which is c. 10 000 m^3. The metal detector survey has, in contrast, covered all 20 000 m^2 in the course of a number of years during which the plough soil, which is about 25 cm thick, has been turned several times by cultivation. The majority of the metal artefacts have accordingly been found in this way, i.e. an area of about 20 000 m^2 has been investigated to a depth of about 0.25 cm, giving a volume of about 5 000 m^3 (or about 50% of the culture layer) which has been searched with a metal detector. Seen in this way it is clear that more metal artefacts were found per investigated m^3 by excavation than by metal detector survey.

In order to obtain a better impression of the complicated situation regarding the culture layer, some large areas were exposed in 1995 and investigated either the same year or in 1996. As mentioned above, a total of about 2 000 m^2 was exposed, but due to the thickness of the culture layer it was not possible, within the financial limits of the project, to excavate the whole of the exposed area down to the subsoil. The excavation concentrated on investigating some of the very obvious features and structures, which were apparent

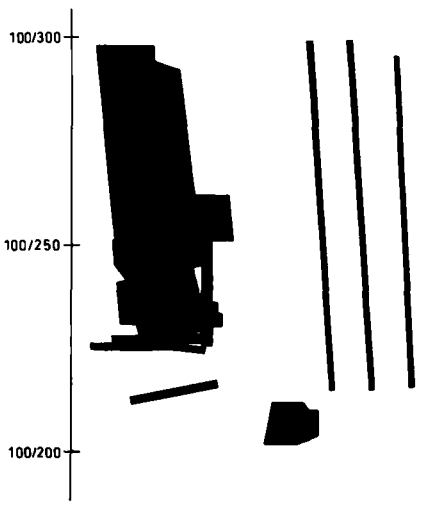

Fig. 10. The area of excavation.

in the culture layer. Of these, large patches of burnt and unburned clay were among the most spectacular. The patches of clay proved to cover several different feature types. In an area where a small field had been placed because large quantities of burnt clay had been ploughed up, it became apparent that the clay came from partially ploughed-up ovens. Immediately after the plough soil had been removed, there was a continuous clay surface comprising partially red-fired, partially unburnt yellow clay. With further cleaning of the surface this dissolved into several oval patches of predominantly burnt clay. Each patch measured about 1 x 1.5 m and represented the base of an oven. The oven bases were constructed of head-sized granite boulders in between and over which clay had been laid. The clay was fired red and showed signs that the base of the oven had occasionally been re-covered with a new layer of clay. Around one of the ovens there were clear traces of branches, which are interpreted as remains of the dome-shaped upper part of the oven. Within this small field the remains of a total of six ovens were uncovered. On the larger fields a further oven of the same type was excavated but it was not so well preserved. It was not possible to establish the function of the ovens as no artefacts or other material were found around them, which were not also found elsewhere on the site. The ovens belong to the Roman Iron Age phase of the site and probably the Early Roman Iron Age. At least, half a vessel of Early Roman Iron Age type was found on the edge of one of the ovens. It has not been possible to find parallels to these ovens from the Roman Iron Age elsewhere in Denmark. There are, however, ovens of the same type from a much later date; these have had uses, which include baking.

Another type of feature incorporating clay comprised small forges. These consisted of approximately circular clay plates about 10 cm in thickness and with a diameter of 50-60 cm. The central part of each clay plate was totally red-fired while the outer edge consists of unburned clay. Small concentrations of burnt stones, generally rather smaller than a fist, along with vitrified clay, sometimes with the impression of a bellows hole, were found around the plates. Presumably the clay plates were originally bowl-shaped but ploughing and levelling out at the site has lead to only the base of the bowl-shaped forges still being preserved.

A last occurrence of red-burnt clay was found spread over a large area but it was not possible to interpret its function. It is possibly the levelled-out remains of some clay structure.

In the largest field a fence ditch was investigated. It was about 1 m broad and of variable depth. Postholes were found in the base of the ditch and in some cases it was possible to detect the postholes already in the fill of the ditch. Generally, it was difficult to recognise the postholes in the very heterogeneous culture layer. The fence ditch clearly divides the site up into areas with different functions, such that all the occurrences of burnt clay, ovens and forges were found to the south of it. North of the fence a single large clay pit was investigated. Otherwise it was cooking pits and similar features in particular which were found in this area.

Roasted bog iron was found all over the site, not as hard concreted lumps but in the form of powder or fine granulate. These occurrences, together with the abundant plano convex slags, have led to the idea that iron smelting may have been carried out on the site. However, neither iron-smelting furnaces nor blocks of tap slag have been found to confirm this. A quantity of forging waste was recovered with the aid of a magnet. Together with the Plano convex slags this shows that forging was a significant activity at the site. A series of analyses have been carried out on the slags. By comparing the trace elements in the slags with those in one of the knives from the site it could be established that this knife was made of the same kind of iron, as there was traces of in the slag[3].

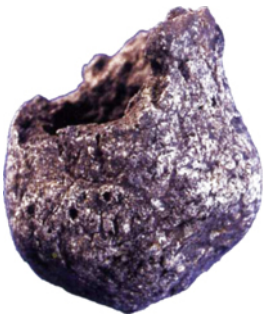

Fig. 11. Nearly intact crucible from Hørup. Scale 1:1.

[3] These analyses were kindly carried out by civil engineer Vagn F. Buchwald, who is thanked for permission to reproduce the information.

Large heaps of stones, comprising fist-sized fire-shattered pieces of granite, were investigated at two places within the excavated area. The largest of these heaps included ten round hammer stones and abundant Plano convex slags. The round hammer stones have sometimes been interpreted as simple hammers used in the working of the iron bloom, so this heap possibly represents a refuse dump from a smithy.

Among the less spectacular workshop areas are those associated with bronze casters. Concentrations of melted drops, scrap bronze and crucible fragments have been found in two places, but actual traces of the workshop constructions have not been found. The crucibles were of two different types; there was an almost intact crucible of eggcup form (Fig. 11), but only half the size, as well as a number of fragments of larger crucibles. Some of the crucibles were equipped with a small lug. Only one definite example of a mould was found and it was not possible to ascertain with absolute certainty what had been cast in this mould. It may have been was used to cast bronze spurs. In the light of the relatively large number of metal artefacts at the site it is frustrating not to be able to identify a single type, which, with certainty, was produced in the excavated metal workshops.

It appears that bone worker worked together with the bronze caster, or at least their waste products were found together in the same two areas of the site. The bone worker utilised bone from large mammals, horns of cows and goats as well as antler from red deer, elk and roe deer. The waste products from these species are found in varying quantities, with cow's horn and red deer antler being the most common raw materials. The cow's horn itself is not preserved at the site but the horn cores, on the other hand, are (Fig. 12). With their clear kerfs these show how the horns were sawn prior to being worked. The bone worker produced a varied selection of products of which we probably have only found a limited range. Combs were made in the workshops, comprising both single and three-layered examples Fig. 13). The latter were assembled with iron rivets, which is an unusual feature for Zealand. As a curiosity, it can be mentioned that none of the three-layered combs found locally in graves was assembled with iron rivets but with rivets of bronze. In addition to combs, several forms of needle or pin were manufactured; some of these had been turned on a primitive lathe. The preserved heads from broken pins include a turned example with a figure-of-eight-shaped head, one with a four-sided head decorated with criss-cross-

Fig. 12. Examples of the several hundreds of cow horn cores that have been worked at the site. Scale ca. 2:3.

sed hatching and one like a darning needle with an eye (Figs. 14-15). A turned spindle whorl of antler or bone, presumably the latter, was also found; it was decorated with concentric circles around the hole. Various simple bone bodkins and some pieces very reminiscent of Pre-Roman and Early Roman Iron Age bone spearheads made from the metatarsii of sheep or goat were also recovered. The examples from Hørup are, however, generally smaller and have a chisel-like edge instead of a point. A fragment of a branch from a red deer antler can also be presumed to have been a product of the bone worker at the site. There are also a number of other artefacts of unknown function but produced with great skill by the bone worker.

Despite the fact that the dating framework for the site, judged from the fibulae found by metal detector, extends from the Early Roman Iron Age B2 until the Early Germanic Iron Age, none of the artefacts recovered from the culture layer can be dated securely to the latter period. It must therefore be presumed that the most of the culture layer from the Germanic Iron Age has been ploughed off and only part of the Roman Iron Age layers is still preserved. The investigated features can then very probably all be assigned to the Roman Iron Age, although it is difficult to distinguish the Early and Late Roman Iron Age features from one another.

Even though some quantities of pottery and bones, as well as a few glass beads, were occasionally recovered during the metal detector surveys, these find groups

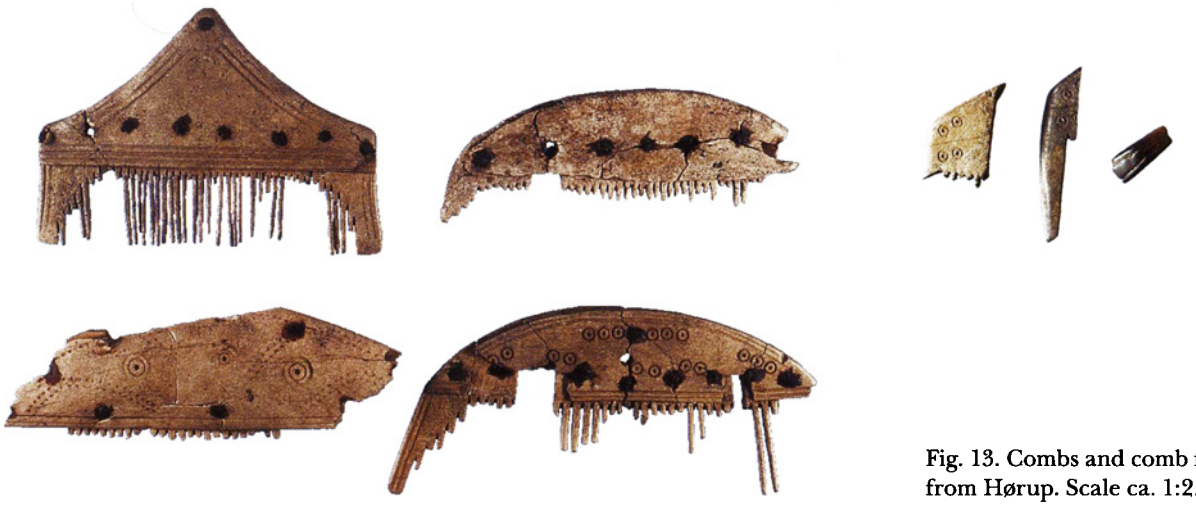

Fig. 13. Combs and comb fragments from Hørup. Scale ca. 1:2.

Fig. 14. Examples of the presumed products in the shape of various pins and needles manufactured by the bone workers at Hørup. Scale ca. 1:1.

were much better represented in the excavated material. The pottery has not yet been examined in detail but relatively large quantities were found during the excavation, comprising primarily undecorated pottery, which, on the basis of rim profiles, vessel forms and occasional decorated specimens dates from the Early to Late Roman Iron Age.

Interpretation

The impression gained already after the first metal detector surveys, i.e. that workshop activity had taken place at the site, was confirmed in full during the excavations. Artefact groups not found during the metal detector surveys, i.e. primarily non-metallic artefacts, to a great extent augmented the testimony of the site.

The fact that bronze casting took place on the site was already strongly suggested by the finds of melted drops of bronze and bronze ingots prior to the excavation. With the excavation, these find groups were greatly increased and at the same time there were finds of crucibles and fragments of casting moulds, which contributed to the impression of the site as having had workshops. The excavation also revealed several forges in which the smelting of bronze presumably had taken place. It is likely that silver and gold were also worked but this cannot be securely documented as these metals have only been recovered in the form of finished products. The Roman denarii can possibly be interpreted as raw materials intended to be worked further at the site.

Fig. 15. The bone workers may have had a broad variety of products like these examples. Left a fragment of a cheeck piece of red deer antler, in the middle a spindle whorl of either bone or more likely antler, and right a handle of red deer antler. Scale ca. 2:3.

The working of horn, antler and bone was already suggested by finds collected from the surface of the field prior to the excavation. As a result of the excavation, these workshop activities were also exceptionally well-documented. Similarly, it can be demonstrated that several products made in these materials have been produced in the workshops at Hørup. This applies first and foremost the single layered and three-layered combs of red deer antler as well as the bone needles and pins. Other bone and antler tools have also been found but these are only represented by a single example of each type. Of these types, mention can be made of a turned spindle whorl of bone or antler, a broken branch from a red deer antler, a decorated bone plate of unknown function, a trapezoid bone plate with two perforations etc. Sawn-off horn cores from cattle show that cow horn was also worked, but as this is not preserved nothing can be said of the products for which it was used.

As mentioned above, only a small part of the workshop area has been excavated and on this occasion no evidence was found of long houses, although it must be presumed that the workshop site was linked to a settlement in the vicinity. Judging from the trial trenches, it seems likely that this settlement should be sought to the north and northeast of the workshop area; here the culture layer is relatively thick and contains abundant bones, potsherds and cooking stones but lacks characteristic workshop refuse. In order to understand fully the role of the Hørup site in Iron Age society it is also important that this area too be investigated. However, in the first instance it is necessary to secure as much information as possible concerning the workshop area as the damaging effects of ploughing have clearly accelerated in recent years. The excavation also showed, in no uncertain terms, that even though the culture layer was in some places more than 1 m thick, the features and workshop refuse were almost always concentrated in the upper 10-20 cm of the undisturbed culture layer. This means that the continued ploughing of the field will, in the course of the next 10-15 years, probably have removed this important part of the culture layer forever.

Conclusion

Despite the fact that the Hørup site has been known to the museum world since 1959, it was first after the introductory metal detector searches in 1990 that the special character of the site became apparent. We have here an example of how metal detector archaeology can contribute to changing or augmenting our knowledge concerning the function and potential of well-known sites. The investigation also shows, however, the limitations of metal detector archaeology; the material recovered in this way is very uniform. The conclusion must therefore be that metal detector surveys are well suited for the selection of interesting sites for further investigation but are an inadequate basis alone, on which to draw far-reaching conclusions. Those that originally were apparent through metal detector surveys as the outline of a possible workshop site first became fully documented as the result of subsequent excavations, during which, completely new crafts such as bone working were demonstrated. With well-documented workshop activities as early as the Early Roman Iron Age, Hørup is one of the earliest specialised workshop sites in Southern Scandinavia. It is hard to imagine that the initiative for the establishment of a specialised workshop site at this time could have come from outside the confines of the highest echelons of the society. If other documentation for the presence of such a power elite is sought, for example in the form of graves or votive finds, there are a number of finds of this type from the area which are far above average (Sørensen 2000; Sørensen this volume).

That which, with the discovery of the workshop site at Lundeborg (Thomsen et al. 1993), came as somewhat of a surprise, i.e. that there were specialised workshop sites linked to regional centres of power and wealth already in the Roman Iron Age, is today something which we should expect to find in connection with all central sites from that time. Hørup, Uppåkra, Lundeborg and Østervang are just some of the examples of sites with workshop activities from the Roman Iron Age, which have been found or dug out of obscurity in recent years (Helgesson 1998; Thomsen et al. 1993; Tornbjerg 1998). Whereas power centres previously were primarily defined solely on the basis of wealth and imported grave goods (Lund Hansen 1987; 1991), in coming years we will probably see that the presence of workshop sites will also become a significant factor in defining and distinguishing power centres from the Roman Iron Age in Southern Scandinavia. If it is possible to locate the workshops where the prestige weapons and jewellery of the day were produced, this will present some exiting opportunities for the mapping of alliances and connections expressed precisely through the exchange of such prestige objects. Unfortunately, we have yet to reach this stage.

Translation: David Earle Robinson & Anne Bloch Jørgensen

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References

Hansen, Ulla Lund, 1987: *Römischer Import im Norden. Warenaustausch zwischen dem Römischen Reich und dem freien Germanien.* København 1987.

Hansen, Ulla Lund, 1991: Himlingøje-undersøgelserne. Om baggrunden for Stevnsområdets rige gravfund i yngre romertid. In J. Fabech & J. Ringtved (eds), *Samfundsorganisation og Regional Variation. Norden i romersk jernalder og folkevandringstid.* Århus 1991.

Helgesson, Bertil 1998: Vad är centralt? - fenomen och funktion; lokalisering och person. In L.Larsson & B. Hårdh (eds), *Centrale Platser Centrale Frågor.* Archaeologica Lundensia No. 28, Lund 1998.

Liversage, David 1980: *Material and Interpretation. The Archaeology of Sjælland in the Early Roman Iron Age.* København 1980.

Sørensen, S.A. in prep: Hørup - en sjællandsk værkstedsplads fra romersk jernalder.

Thomsen, Per et alii 1993: *Lundeborg - en handelsplads fra jernalderen.* Ringe 1993.

Tornbjerg, Svend Åge 1998: *Arkæologiske udgravninger i Danmark* 1997, nr. 41. Det Arkæologiske Nævn. København 1998.

Ørsnes, Mogens 1988: *Ejsbøl I. Waffenopferfunde des 4.-5. Jahrh. nach Chr.* Nordiske Fortidsminder Serie B Band 11. København.

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Metal detector finds from Lærkefryd, Zealand

Votive offerings from the Late Roman Iron Age - Viking Period

by Søren A. Sørensen

Introduction

Lærkefryd is the name of a farm located in Jørlunde parish, about 1 km east of the village of Jørlunde in North-eastern Zealand (Fig. 1). As early as 1817 an exciting find comprising four gold bracteates was made in a field north of the farm (Fig. 2). These were discovered during cultivation of the field and were handed in to the National Museum[1]. In 1833 gold was again found in the field, this time in the form of a broad ribbed finger ring; on the same occasion a number of glass beads were also found. Subsequently, nothing was heard of Lærkefryd for more than a century, but in 1990, inspired by the early finds, the Museum Færgegården began metal detector surveys on the fields around the farm with a good degree of success.

As mentioned above, the farm Lærkefryd lies about 1 km east of Jørlunde and the farm's fields border on to Jørlunde common, the name given to an area of elevated and strongly undulating land. The field where the finds were made slopes first gently, then more steeply, down to the north. The ridge on which Lærkefryd lies is separated from the village of Jørlunde to the west by an elongated cleft bordered by steep slopes. This cleft bears the name of Rappendam Bog, a name which is probably quite familiar as it was here in the 1940s that a votive find from the Early Roman Iron Age, comprising 40 wheels and parts of weapons etc., was discovered (Fig. 3). Philologists have linked the name Jørlunde, which is said to mean »wild boar grove« with a heathen offering, so there are clear indications of a cultic aspect in the prehistory of the area. There is only about 4 km as the crow flies from Lærkefryd to the workshop site of Hørup, which is mentioned elsewhere in this volume.

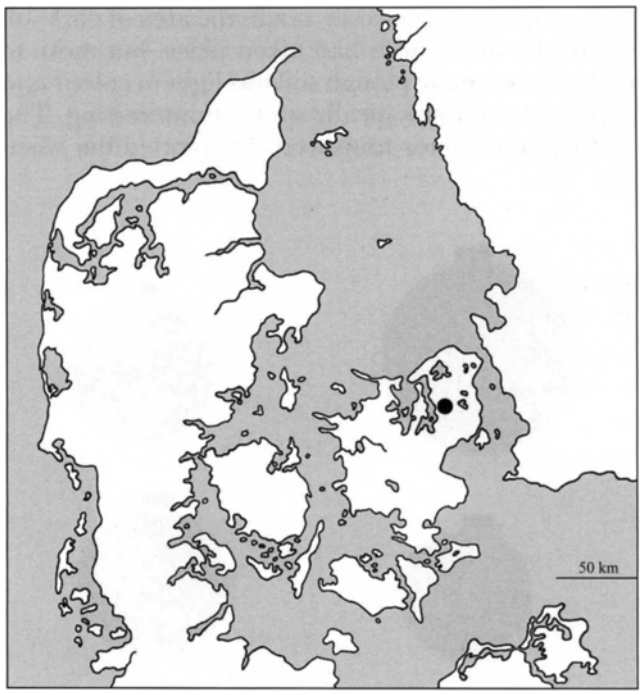

Fig. 1. The location of Lærkefryd.

[1] The find appears in Mogens B. Mackeprang (1952) under the name of »Hjørlunde Mark« (find no. 25), but as there are today several archaeological finds, including some from the Germanic Iron Age, around Jørlunde, the more precise site name of Lærkefryd has been used in this article.

Metal detector finds

The first problem when checking a find, which was made more than 150 years ago, is often localisation of the precise find site. This did not, however, present a major problem at Lærkefryd. The information in the Parish Archaeological Record is relatively precise and included the following description of the site which was a further help in the localisation: »On a rounded patch, there is 1 foot of black earth under the surface in which there are occasional small stones. Here were found the bracteates (National Museum nos. LXXVII-LXXX), and the gold finger ring (NM 2782), as well as glass and mosaic beads, in addition to a black pendant (from the Stone Age)«. The area with the black soil was localised on the first visit to the site, and in the light of the description given above it was naturally this area, which was searched with a metal detector. The result was, however, negative with regard to metal finds and had it not been for the finding of a green ribbed bead the control reconnaissance of the site may have been abandoned at this point. On the strength of the glass bead it was decided to give the site another chance and this proved to be a fortunate decision.

The first detector searches carried out subsequently turned up several Roman denarii and a piece of hack gold. These were, however, not in the area of dark soil where the first search had taken place, but more to the west where the plough soil was light in colour and appeared archaeologically quite uninteresting. The first metal detector finds were not plotted but when

Fig. 2. The four gold bracteates found in 1817 at Lærkefryd.

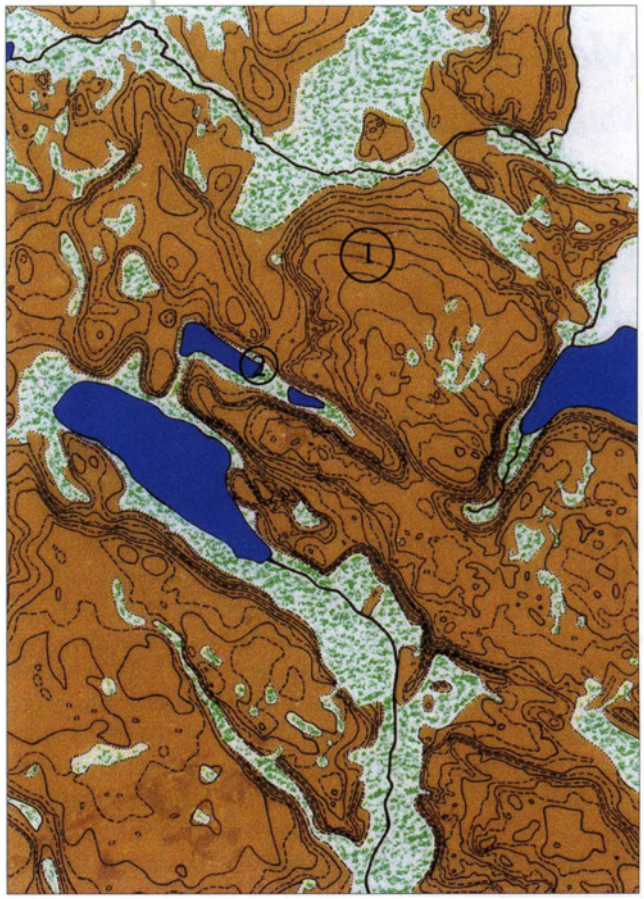

Fig. 3. The topografical setting of 1) Lærkefryd and 2) Rappendam Bog. Scale ca. 1:40.000.

finds continued to turn up after several surveys, two measuring points were set up in the nearby property boundary. Subsequent finds were plotted in relative to these with the aid of a measuring tape, allowing the distribution of finds to be documented.

Up until 1992, 19 denarii were found on the field, leading to the assumption that there was possibly a ploughed-out and scattered denarii hoard at the site. Even though only 11 of these coins had been plotted in, it was enough to give an impression of their distribution. The mapping of the finds had the primary aim of allowing the deposition site for the presumed hoard to be located. In the autumn of 1992 it was decided to carry out a small excavation at this site. The topsoil was removed where the concentration of plotted-in metal detector finds had been greatest and a small field measuring about 30 x 40 m was exposed using a mechanical digger. The excavation was carried out such that a 5-10 cm thick layer of soil was removed, one

Fig. 4. Finds from metal detector surveys in the 1990s and the excavation in 1992. The finds covers the period from the Late Roman Iron Age to the Viking Period. Photo Kit Weiss.

strip at a time, after which the whole strip was scanned with a metal detector. In this way a further 17 denarii were located; these were also plotted in. There is a great degree of agreement between the distribution of the denarii found with a metal detector and that of those found during the excavation. This is taken, as showing that there probably originally was a collective deposition of denarii at the site. Traces of the actual burial site were, however, not found, as all the denarii were all recovered from the plough soil, which is not very thick here.

In addition to the denarii, five pieces of gold were found during the excavation. Four of these were hack gold, the fifth a ribbed finger ring, which had been

hammered flat. The gold finds were rather more scattered than the denarii and there was no overlap between the plots for the gold pieces found with a detector and those which were found by excavation although the two groups lay very close to one another. Further to the gold and the denarii, various other types of find were recovered during the metal detector searches. The picture, which emerged from these, was further supported by the results of the excavation.

This small excavation had had the aim of clarifying the extent to which there were undisturbed parts of the buried treasure hoard below the plough soil. Detector searches of the field have, however, continued since 1992 and up to the present day, and the field still produces finds, although not so many as in the first years (Fig. 4).

In summing up the finds from Lærkefryd, it can be said that they are widely scattered both chronologically and typologically, but two groups of finds appear with greater frequency than any other: Roman denarii and hack gold. 47 denarii and 15 pieces of hack gold have been found to date, in addition to five gold finger rings, including the one found in 1833. The finger rings are not all of the same type; there are three ribbed rings, one smooth ring and, finally, one badly damaged snake-head fingerring. The gold finds also include two thin gold wires which could either be so-called adjustment wires or spiral finger rings that have been straightened out, as well, of course, as the four bracteates found in 1817. Silver finds, besides the denarii, include a quantity of hack silver and a single dirhem. The dirhem was, however, found a good distance from the concentration of denarii and should most probably not be seen as part of the denarius hoard. The hack silver comprises several cut up pieces of thin rectangular silver plates, originally decorative mounts on harnesses. Very similar pieces are known from the Illerup site (Ilkjær 1996, vol. 7, tab. 7). A fragment of a gilt silver scabbard mount, with carved decoration in the Nydam style, was found during the small excavation at the site, together with a piece of gilt silver foil of unknown function. The latter was decorated with punched ornamentation and a chequered margin. A small piece of crumpled silver foil could not be identified to type, but is very reminiscent of decorative sheet silver from the magnificent sword scabbards found in Nydam Bog (Engelhardt 1865; Rieck 1994) (Fig. 5). Further to this, there are two damaged silver fibulae; one, which cannot immediately be identified to type and a damaged rosette fibula. A fragment of a finger ring with a flower-like motif concludes the unburned finds of silver, but mention should also be made of a small piece of melted silver found on the field.

Artefacts of gilt bronze were found in large numbers on the field, but some of these are cut up pieces from the same equal-armed fibula (Fig. 4, centre). This was a magnificent fibula, made in gilt bronze as already mentioned, but further decorated with riveted-on plaited silver wire and, uppermost, the plastic animal form. Further to this, two circular pendants have been found, also of gilt bronze, as well as two fragments, presumably from a circular bronze ferrule and equipped with a gilded silver rivet.

Finds of bronze or corresponding copper alloys include a cast hourglass-shaped sword hilt in three parts (Fig. 4, top left and Fig. 7), the foot of a cruciform fibula and a melted lump of bronze (possibly an almost completely melted cruciform fibula), a bronze bridle hook of bronze and no less than 12 bronze rings (Fig. 4-5). The largest of these rings has an outer diameter of 5.1 cm, whereas the others all have a diameter of around 2.5 cm. Corresponding rings are known from the Ejsbøl find, where it can be shown that they come from harnesses and saddles (Ørsnes 1988). A similar interpretation of the rings from Lærkefryd seems reasonable in the light of the certain finds of harness fragments from the site. The remaining bronze finds include an oval plate brooch with an animal in »costal pattern«, clearly a cow or

Fig. 5. Lærkefryd. Fragments from horse harness and sword scabbard from the Late Roman Period. Photo Færgegården Museum.

a bull with a large pair of horns, two fragments of strap buckles, a possible weight, several fragments of a thick bronze handle as well as many unidentifiable bronze fragments.

Only a single iron artefact has been found which can, with certainty, be linked with the other finds. This is a slender iron axe head, of a type, which is known from sites such as Nydam Bog and Lundeborg (Fig. 6). During normal metal detector searches iron is not collected, but after the finding of the axe, iron was, for a period, also collected from the site, which gave a large amount of finds. Unfortunately, all the recognisable finds were on this occasion of recent date.

There were occasional finds of glass beads in connection with both the excavation and the metal detector searches. In all eight beads were found, in addition to those found in the 19th century.

Fig. 6. Battle axe from the Late Roman Period C3 or Early Germanic Iron Age. Photo Færgegården Museum.

Dating of the artefacts

On the basis of the four gold bracteates which were first found at Lærkefryd, the site was originally perceived as a locality with one or more hoards from the Early Germanic Iron Age, despite the fact that the Roman denarii are earlier than this date. Denarii, in particular, are often deposited together with much later artefacts[2], which demonstrates the rather long circulation period for these coins. There is, accordingly, nothing to hinder the fact that the denarii were first deposited in the Early Germanic Iron Age. With time, however, as other artefacts began to turn up which very probably were deposited either prior to or subsequent to the Early Germanic Iron Age, the question of the dating had to be reconsidered. It could be established that several depositions must have taken place on the field, over a long period of time. This is not unusual in the case of a settlement, but the composition of the finds is not suggestive of a normal settlement; an impression supported by the results of the small excavation.

The earliest group of finds comprises the Roman denarii, of which the oldest was struck under Vespasian in 72-73 AD. The youngest is an example from Commodorus from 190-191 AD[3]. If this is, as presumed, a collective deposition of coins, the youngest coin gives a terminus post quem for the deposition which could have taken place around 200 AD at the earliest, corresponding to the Late Roman Iron Age phase C1a. The finding of the damaged rosette fibula, which is dated to C1b and the serpent's head ring from C2, supports the fact that the first depositions at Lærkefryd took place as early as the Late Roman Iron Age[4]. The harness components also seem to have their best parallels in Late Roman Iron Age finds and finds from the transition between the Late Roman and the Early Germanic Iron Age (Carnap-Bornheim & Ilkjær 1996; Ørsnes 1988). It is more difficult to determine whether the many pieces of hack gold also come from the Late Roman Iron Age. The fact that gold was deposited on the field in this period is shown by the serpent's head ring. Similarly, hack gold of the same form as the pieces from Lærkefryd is known from secure Roman Iron Age contexts, for example at Lundeborg (Thomsen *et al.* 1993). Hack gold, and

[2] The classic example of this is the hoard from Smørenge on Bornholm where, in addition to c. 500 denarii, there also was a solidus from the 5th cent. (Kromann & Watt 1984).

[3] It should be noted that when Anne Kromann dealt with the coins from Lærkefryd in 1995 in the book on Himlingeøje (Lund Hansen *et al.* 1995), only 36 denarii had been found. Since then a further 11 denarii have been recovered and the date for the striking of the latest coin is now 190-191 Ad and not 180-186 AD, as stated in Kromann's article. At the same time, the increased number of denarii means that Lærkefryd is the second largest denarius find from Zealand.

[4] The ring is of Beckmann's type 39c which is normally placed in period C2 (Beckmann 1969).

other gold finds which are difficult to date, have traditionally been dated to the Early Germanic Iron Age but, in the light of finds from recent years, one should perhaps keep a more open mind with regard to the age of these gold finds.

The Early Germanic Iron Age is securely represented by the four gold bracteates and the foot from a cruciform fibula. The sword hilt and the iron axe head are presumably also from this period, although a date in the Late Roman Iron Age period C3 is also possible. The only secure find from the Late Germanic Iron Age is a small tortoise brooch. The dirhem dates from the Viking Age, as does the heavily fragmented equal-armed fibula and the two circular gilt bronze pendants. The find intensity appears to be greatest in the Late Roman and Early Germanic Iron Age, after which it falls almost to zero in the Late Germanic Iron Age, only to recover slightly in the Viking Age.

Ritual destruction of the objects?

An aspect, which has not been mentioned so far, is the almost ritual destruction, which many of the recovered artefacts had been exposed to prior to deposition. The serpent's head ring is fragmented and hammered flat; on the basis of impressions in the soft gold this was done using a stone as a base. One of the other gold finger rings has been treated in the same way and appears today as hammered completely flat. The rosette fibula lacks spirals, pin, part of the catch plate and the rosettes. The other silver fibula consists only of the foot and part of the bow. The silver ring is also fragmented. The hack gold is not just cut up into small pieces but the individual pieces also often show many cuts from blows with both the back and the edge of a knife. The sword hilt has a severe cut in the edge as if from a sharp instrument and the bronze ferrule has been broken into several pieces of which only two have yet been found. The metal foil from a scabbard mouth has been cut in two and several pieces of gilt silver foil are also strongly deformed and crumpled. The decorative silver plates from the harness are bent double and have been cut or chopped into quite small pieces. The robust cast bridle hook has been broken into pieces. The large equal-armed fibula from the Viking Age has so far been found in eight pieces; all the pieces have not yet been recovered.

The melted lump of silver, as well as several lumps of melted bronze, of which one can possibly be interpreted as an almost completely melted cruciform fibula, shows that destruction of artefacts by fire also took place at the site. Several of the other artefacts are also damaged but this could be the result of cultivation or other activities. The above-mentioned damage appears, however, to be the result of formal ritual destruction of the artefacts in connection with deposition. It should, however, be mentioned that there are some artefacts which have not suffered this treatment; primarily the gold bracteates, the denarii and the two circular pendants from the Viking Age.

The excavation

The small excavation, which was carried out at the find site, had, as already mentioned, the sole aim of establishing the existence of a ploughed-up denarii hoard, possibly with intact parts below the plough soil. The latter was not the case, so we can only speculate as to

Fig. 7. Lærkefryd. Cut up sword hilt of bronze from the Early Germanic Iron Age. Photo Færgegården Museum.

whether the denarii originally were deposited together or not, although their relatively close distribution suggests a collective deposition. The excavation gave an additional piece of information, namely the fact that apart from a very few cooking pits, a small pit lacking in finds and two isolated postholes, there were no other features below the plough soil. The excavation field was not so large as to allow the drawing of too broad conclusions, but nothing appeared which could be interpreted as traces of an actual settlement. In view of the long period over which the site functioned, as shown by the finds, a massive occurrence of settlement traces would be expected if the artefacts have been buried or lost on a settlement.

Interpretation of the find

The interpretation of the character of the site has developed in pace with the appearance of new finds and through comparisons with other finds of the same age. The earliest interpretation, based on the find of the gold bracteates, gold ring and glass beads was that this was a single buried hoard. When the metal detector surveys began to produce finds over a large area, with a broader chronological range, it seemed obvious to interpret the area as a rich settlement on a par with Sorte Muld and Gudme, where small hoards are found buried on the settlement itself together with large amounts of more ordinary settlement material. This interpretation was, however, again abandoned in the light of the find assemblages of finds from the site, their treatment and observations made during the small excavation.

With a full awareness of the dangers inherent in basing interpretations on negative evidence, i.e. the absence of certain categories of finds, it must be emphasised that finds typical of ordinary settlement material are totally absent in the finds from Lærkefryd. The find categories, which do appear at the site, are, in the first instance, precious metals, weapons and jewellery. Furthermore, it appears that these artefacts were, for the most, damaged prior to deposition, possibly as a ritual act.

Ritual destruction of this type is known from both burial and votive finds. As the possibility of the presence of graves at Lærkefryd can be immediately excluded, an interpretation of the locality as votive site remains. As mentioned in the introduction, the possibility has already been raised that there was a heathen cult site at Jørlunde; a theory, which is based on interpretation of place names in the area[5]. If one considers the c. 700 years represented by the finds, then the amount of finds is not very impressive. However, it should be remembered that this is a terrestrial deposition on a site, which has been ploughed for centuries. The possibility that artefacts have been found and removed from the site prior to the finding of the four gold bracteates in 1817 seems particularly obvious. Similarly, artefacts comprising iron and organic materials will largely have decomposed and disappeared. Accordingly, the possibility cannot be excluded that the original amount of finds was much greater and that it also was of a much more complex character with regard to artefact type. In this respect it is worth mentioning a more traditional votive site, which lays only a few hundred metres west of Lærkefryd, i.e. Rappendam Bog. It was here that numerous wagon wheels, parts of weapons, a human skeleton and several animal bones were found in the 1940s (Kunwald 1950; 1970). This find dates from the Late Pre-Roman Iron Age and the Early Roman Iron Age and as such pre-dates the Lærkefryd finds. If the finds from Rappendam Bog had been deposited at Lærkefryd, there would today not be the least trace of these offerings. Recent excavations carried out in Nydam and Ejsbøl Bogs have shown that even in these wetland depositions the destruction of the sacrificed artefacts is almost total in the driest areas on the margins of the bog. Under these circumstances only artefacts of gold, silver and bronze are preserved, exactly the situation we see at Lærkefryd. Well knowing that interpretations of archaeological finds as being the expression of cultic or religious manifestation is most commonly met with severe criticism, this is the interpretation which, on the basis of the available finds, appears most obvious for Lærkefryd today. The possibility that there has been a settlement here cannot, however, is completely excluded. A clear answer to this question is a matter, which should be addressed by a future excavation.

Finally, if an assessment is to be made of the signi-

[5] In the publication of »Valdemar's Cadastre« (Aakjær 1980, 156ff.) the following is written: »The name of Jørlunde presumably comes from an old cult site and on this and Skænkelsø village's land there are occasional field names which suggest the worshipping of heathen gods.« The name Jørlunde is said to mean Wild Boar Grove and to refer to an offer grove.

ficance of the metal detector for a find such as Lærkefryd, then this must be said to have been crucial. The metal detector surveys of well known find sites which were initiated in 1990 have shown that many of these still contain finds and can provide information of great cultural historical value. It has also become clear that the sites can develop quite differently. The two sites, Lærkefryd and Hørup, dealt with in this volume, are an excellent example of this.

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References

Beckmann, C. 1969: Metallfingerringe der råomischen Kaiserzeit im Freien Germanien. *Saalburg-Jahrbuch* 26. Berlin.

von Carnap-Bornheim, Claus & Ilkjær, Jørgen, 1996: *Illerup Ådal bd. 5 - 8. Die Prachtausrüstungen.* Jysk Arkæologisk Selskabs Skrifter 25, 5-8, Højbjerg 1996.

Engelhardt, Conrad, 1865: *Nydam Mosefund 1859-1863.* København.

Kromann, Anne, 1995: Die römischen Münzfunde von Seeland. In Ulla Lund Hansen *et alii 1995.*

Kromann, Anne & Watt, Margrethe 1984: Skattefundet fra Smørenge: en nedgravet skat fra folkevandringstid på Bornholm. *Nationalmuseets Arbejdsmark* 1984, pp. 29-41. København,

Ulla Lund Hansen *et alii*, 1995: *Himlingøje- Seeland - Europa. Ein Gräberfeld der jüngeren römischen kaiserzeit auf Seeland, seine Bedeutung und inernationalen Beziehungen.* Nordiske Fortidsminder ser. B 13. København 1995.

Kunwald, George, 1950: Nogle offerfund fra nordsjællandske moser. *Fra Frederiksborg Amt. Årbog for 1949,* Hillerød 1950.

Kunwald, George, 1970: Der Moorfund im Rappendam auf Seeland. *Praehistorisches Zeitschrift* 45, 1970.

Mackeprang, Mogens B., 1952: *De nordiske guldbrakteater.* Jysk Arkæologisk Selskabs skrifter Bd. II. Aarhus 1952.

Rieck, Flemming, 1994: *Jernalderkrigernes skibe. Nye og gamle udgravninger i Nydam Mose.* Vikingeskibshallen i Roskilde 1994.

Sørensen, S. A.,1993: Skattefund fra Lærkefryd ved Jørlunde. *Arkæologi i Frederiksborg Amt* 1983 - 1993. Nivå 1993.

Thomsen, Per Orla *et alii*, 1993: *Lundeborg - en handelsplads fra jernalderen.* Ringe 1993.

Ørsnes, Mogens, 1988: *Ejsbøl I. Waffenopferfunde des 4.-5. Jahrh. nach Chr.* Nordiske Fortidsminder ser. B 11. København 1988.

Aakjær, Svend, 1980: *Kong Valdemars Jordebog.* Udgivet af samfund til udgivelse af gammel nordisk litteratur 1926-1945, 2. Bind. København 1980.

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Vester Egesborg – a coastal settlement from the Late Iron Age on Zealand

by Jens Ulriksen

ABSTRACT

A coastal site on a sheltered fjord in the southern part of Zealand has in recent years been the subject of continuing archaeological investigations. This article is a preliminary presentation of the numerous metal detector finds and their relationship to the results of the excavations so far.

INTRODUCTION

In the early 1960s an amateur archaeologist was walking on a field near the coast about 500 m south of the village of Vester Egesborg in Southen Zealand (Fig. 1). He was looking for flint tools from the Stone Age but to his surprise he also found several bronze objects and potsherds from the Late Iron Age. The finds included a couple of fibulae from the Early and the Late Germanic Iron Age respectively, a Kufic silver coin and a bronze key, both from the Viking Age, as well as a quantity of potsherds of Baltic ware, which also fall within the chronological limits of the Viking Age. The find site lies innermost in Dybsø Fjord, in an area with a number of interesting Iron Age finds. Several inhumation graves from the Roman Iron Age have been found alongside the main road running north-south between Næstved and Vordingborg, just south of the village of Vester Egesborg. A Viking Age stirrup was recovered on an area of damp pasture adjoining the landing place which will be dealt with in more detail later in this article, and in 1993 a heavily-profiled bronze fibula from the Early Roman Iron Age was found using a metal detector. A few hundred metres further south secondary inhumation and cremation graves from the Iron Age were found in Bronze Age mounds. The finds here included a stamp-decorated clay vessel in a stone cist with burnt bones; a belt buckle and a rectangular belt mount were discovered close by (Ørsnes 1966, 254, Figs. 19-20).

Mogens Ørsnes, then curator at the National Museum's Prehistoric Department, became interested in the amateur archaeologist's finds and initiated a trial excavation on the field by the coast[1]. A very limited area was excavated, and as account had to be taken of

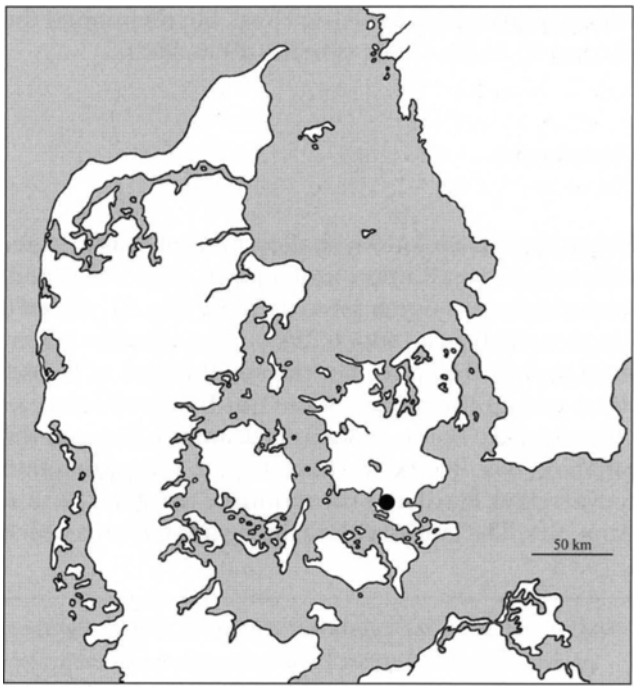

Fig. 2. Vester Egesborg. Location map. The landing place is marked with a black dot.

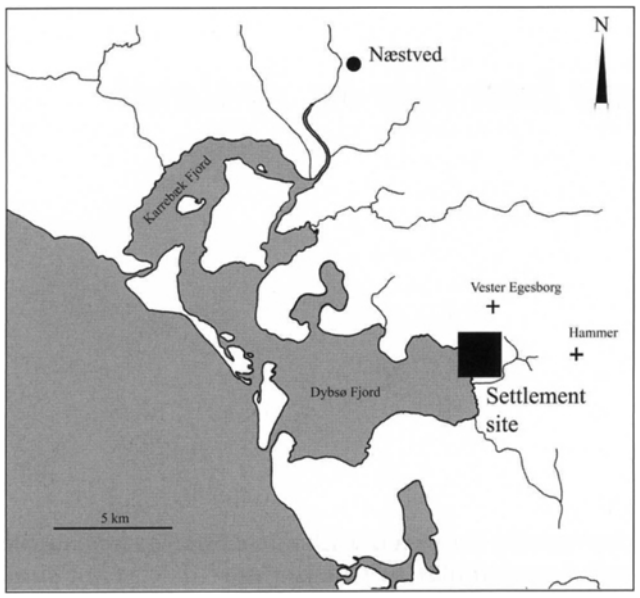

Fig. 2. Vester Egesborg. Karrebæk Fjord and Dybsø Fjord. The landing place (!). Drawn by the author.

the crop on the field, this was therefore concentrated in the southeastern corner. Ørsnes never published the results of his efforts by Dybsø Fjord, but mentioned the site briefly in his thesis (Ørsnes 1966, 262f.).

Topography

Dybsø Fjord is a relatively shallow body of coastal water with several small inlets and a large, now reclaimed, area which runs north towards Vejlø (Fig. 2). About 6 km west of the site, which lies on the absolute innermost part of the fjord, lies the small island of Dybsø, like a cork in the mouth of the fjord; only two narrow channels give access to Karrebæksminde Bay and the Småland Sea. To the northwest there is a connection to Karrebæk Fjord and the mouth of the River Suså at Appenæs. The landing place lies on a sandy area which slopes evenly westwards, down towards Dybsø Fjord. To the north, the coast is characterised by a broad flat beach with shore meadows and reed swamps, whereas to the south and southeast there is a marked upward slope crowned by the burial mound "Stejlebanken" (19 m above sea level). South of here lies the mouth of a stream, Kyllebækken, bordered by low shore meadows and wetlands. To the east, the terrain falls towards a small wetland area some 200 metres away.

Trial excavation in 1965

The area investigated measured about 140 x 150 m. To the north lay a spruce plantation, to the south an area of undulating grassland, to the east the neighbouring property and to the west the beach. There were finds from the Germanic Iron Age and the Viking period especially in the northwestern part of the area but here the owner would not permit an excavation. A Kufic silver coin, a spindle whorl and some potsherds were recovered in the southeastern corner of the area and here a field measuring 20 x 20 m was excavated. From this field, a 1.5 m broad trench was laid out extending 40 m to the north. A corresponding trench of the same breadth, but 60 m in length, was laid out to the west. In addition to this, a 1.5 m broad and 32 m long trench was dug in connection with the find site for a bronze key and several potsherds from the Viking Age. In all, an area of about 600 m^2 was opened up with the aid of a bulldozer. Features were registered in plan, and then a small portion was excavated using trowels or, in some cases, shovels, after which the fill was riddled.

Features were generally poorly preserved in the higher areas; the effects of cultivation were less obvious closer to the beach. In the latter area there was a culture layer dating from when the landing place was in function. The sandy subsoil was affected by animal burrows and in many cases it was very difficult to delimit features in plan.

In his report, Ørsnes lists eight features which he interprets as pit-houses, but he stresses the fact that this is very much a presumption. The features were rarely followed beyond the limits of the excavation field and trenches. This explains why the dimensions of the presumed pit-houses are not always clear. For the same reason the postholes from the roof-bearing construction have not always been exposed. There is no doubt that the very narrow trenches combined

[1] NMI 433/65 "Vester Egesborg" 050401-17, Vester Egesborg parish, Hammer district, Præstø county. A trial excavation was carried out between 9th of August and 3rd of September 1965 directed by museum curator Mogens Ørsnes of the National Museum's Prehistoric Department.

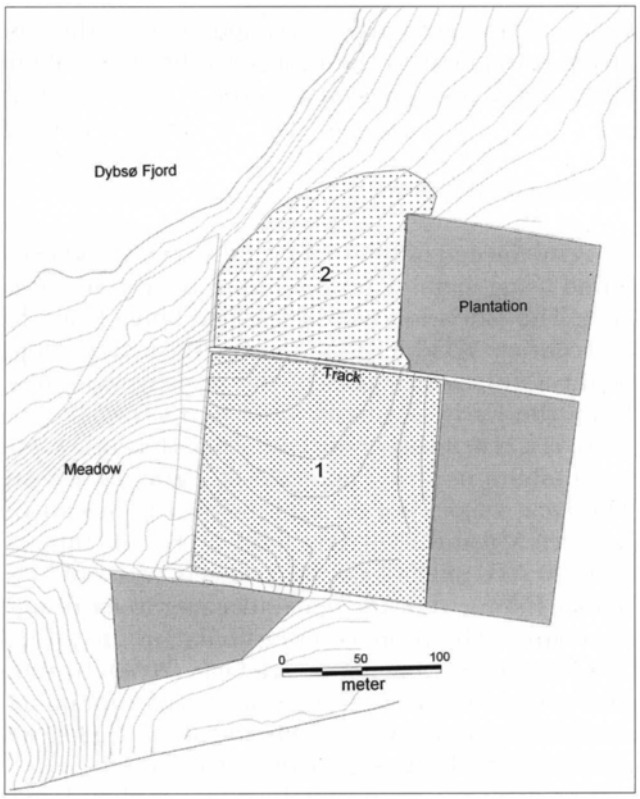

Fig. 3. Investigation area. 1) Intensive metal detector survey, 2) less intensive detector surveys. North to the right. Drawn by the author.

with the difficult subsoil had a negative effect on the conditions for observation. Accordingly, there are only six features from Ørsnes' excavations which can be identified as possible pit-houses on the basis of drawings and descriptions[2].

Metal detector surveys

30 years were to pass before the site came into archaeological focus again. Næstved Museum carried out a visual reconnaissance of the surface in 1995. Detector reconnaissance of the accessible area by Dybsø Fjord was initiated in 1996 in connection with an extensive investigation of landing places from the Late Iron Age in Denmark and previously Danish areas (Ulriksen 1998, 169)[3]. This involved the area subjected to trial excavation in 1965 and a lower-lying field to the northwest where scattered settlement traces had been found on the soil surface. The survey in 1996 was followed up by further metal detector reconnaissance in connection with the trial excavation in 1997 (Gärtner & Ulriksen 1997)[4] and more extensive excavations in 1999[5]. In conjunction with the excavations, searches were always carried out by a team of amateur metal detector enthusiasts.

Between 1996 and 1999 around 150 man-hours, distributed between eight experienced detector enthusiasts, were spent on the almost three hectare area. The searches were not carried out systematically along predetermined transects across the terrain. The intuition of the detector enthusiasts was the main guideline. Not all of the potential settlement areas have been surveyed with equal intensity. Most of the searches were carried out in an area measuring 140 x 150 m east of the track running from north to south (Fig. 3). The searches were less extensive west of the track and in the field to the northwest. Without it being possible to give a precise figure for the hours spent on these less intensive searches, the estimated time used here is only a tenth of that spent east of the track. From the start, iron deflections were discriminated against, whereas all the collected artefacts of bronze, silver and gold were marked on the spot and plotted in on a map at a scale of 1:2000 by a museum employee. It is important to emphasise that the central part of the find area has not been cultivated since 1993, but has lain fallow and as a result has a dense vegetation cover. It was very apparent that the field gave fewer finds during the investigation in 1999 than in 1996

[2] Features E, F, K, M, O and P. In the description below the size and depth below the excavated surface is given, as well as the alignment according to the position of the roof-bearing posts. The distance between the roof-bearing posts is measured from the centre of the posts.

[3] Metal detector reconnaissance was carried out on the 21st April 1996 when a seven-man team searched the area which lay either fallow or as stubble which limited the searching conditions considerably. NÆM 1996:500.

[4] The trial excavation was carried out by Næstved Museum (NÆM 1997:120) and directed by Birgitta Gärtner and the author.

[5] The excavation was carried out by Næstved Museum (NÆM 1997:120) and directed by the author.

Fig. 4. Arabic coins found with a metal detector. Scale 2:3. Photo Jens Olsen.

and 1997. An exception to this were the back-filled trenches. Here the soil had been turned, resulting in the detection of more finds. It is to be presumed that resumed cultivation will result in many new artefacts seeing the light of day.

The finds are very abundant and their density increases steadily east of the track, whereas to the west there are few artefacts and no obvious find concentrations. The number of finds decreases with distance to the west and northwest. This picture is in good agreement with other settlement indicators on the surface of the field, for example fire-shattered stones. These are particularly abundant to the east and less frequent to the west; they disappear about 20 m west of the spruce plantation.

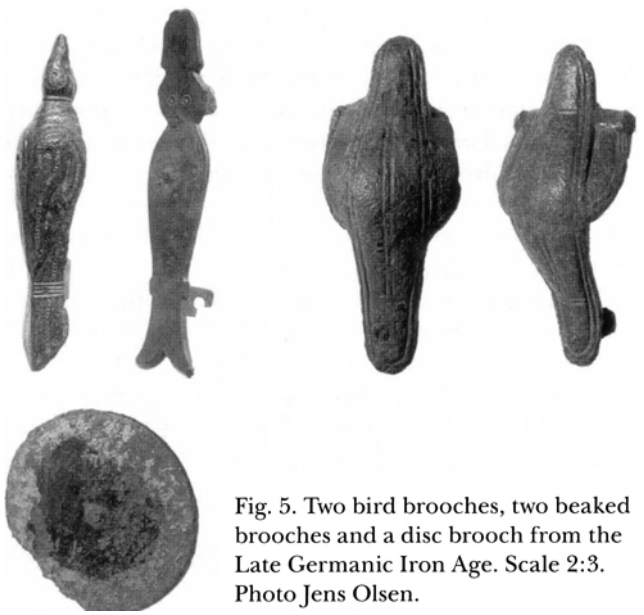

Fig. 5. Two bird brooches, two beaked brooches and a disc brooch from the Late Germanic Iron Age. Scale 2:3. Photo Jens Olsen.

Metal detector finds

Up until the end of 1999 about 150 artefacts had been found using metal detectors within the investigation area. The oldest is a heavily-profiled fibula from the 2nd century AD which was found on the marked slope in the southeastern part of the investigation area. From the Early Germanic Iron Age (375-530 AD) there is a cruciform fibula from the 5th century AD, a gilt mount in Style I and part of a gilt belt mount. The great majority of the finds belongs to the period between 530 and 1000 AD (Table 1). For the interval 530-700 AD, most of the 34 artefacts recovered are fibulae (65%), while the remainder are diverse fittings or mounts. The proportion of fibulae in the period 700-1000 AD is 13 out of 66 artefacts (20%). In addition to these there are fittings, mounts, weapons and coins. The column with the broad dating of 530-1000 AD comprises lead weights and hack silver.

The coins are almost totally dominated by Arabic types. There are 14 whole or fragmented Kufic *dirhems*. At present only eight have been identified and these are dated to the period between 770 and about 900 AD (see Table 2)[6]. Included in the coins is a strange specimen of silver-plated copper which is probably a Volga-Bulgarian counterfeit. The Arabic coins include four *drachmas*, of which only one has so far been identified (Fig. 4). The *drachmas* are markedly different from the commonly occurring Kufic coins in that they have a male portrait on one side and two female figures on the other. According to numismatists at the National Museum, the identified *drachma* is an Arab-Sasanidian coin, struck in Tabaristan south of the Caspian Sea. Here the Sasanidian regime was conquered by the Abbaside Dynasty which retained the old coin types for a while after the conquest[7]. The

[6] The coins were identified in 1997 by Gert Rispling for the Royal Collection of Coins and Medals.

[7] Personal communication from museum curator Jens Christian Moesgaard, the Royal Collection of Coins and Medals at the National Museum.

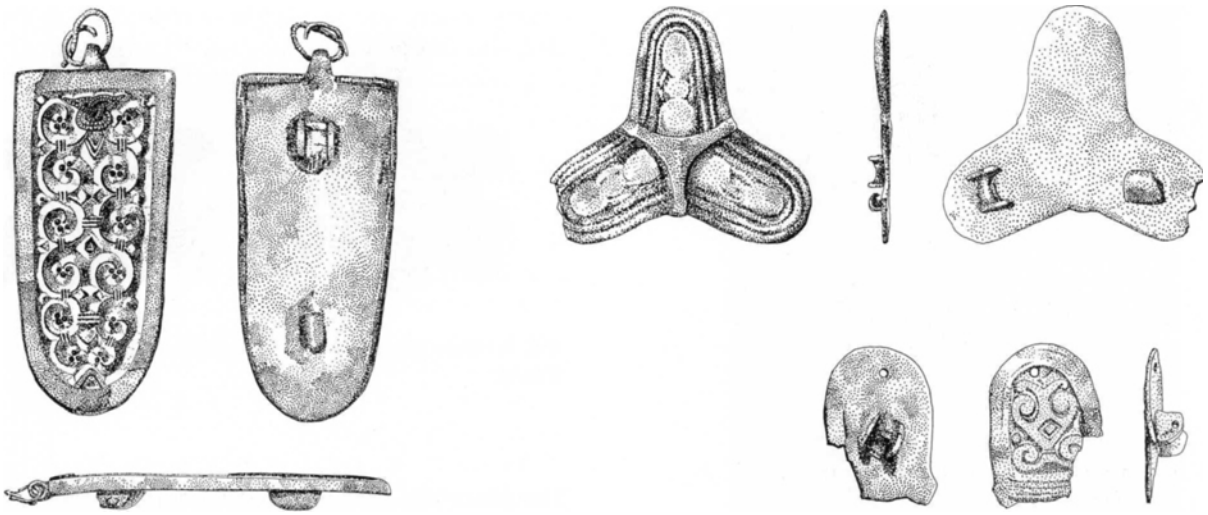

Fig. 6. Tongue-shaped brooch and two trefoil brooches. Scale 3:4. Drawing by Kristian Sørensen.

only Western European example is a *Sachsenphennig* from the middle of the 10th century. It must be stressed that there are no Danish, German or English coins from the 11th and 12th centuries and that the so-called civil war coins from the 13th and 14th centuries are few in number.

Table 3 shows the quite variable distribution of artefact forms from the 6th to 10th centuries AD. As a type, the Late Germanic Iron Age bird brooches are the most common; they occur in both flat and convex versions (Fig. 5). After these come beak brooches and equal-armed fibulae from the same period. The fact that these three types are the most common of the fibulae from the Late Germanic Iron Age is in complete agreement with the picture from the whole of Denmark. Fibulae from the period 700-1000 AD show a slight dominance of rectangular plate brooches as well as fragments of tortoise and trefoil types, which is also not unusual. Much more remarkable is a tongue-shaped brooch of bronze with gilt acanthus decoration. At the straight end there is a small loop of silver-wrapped bronze. There is no doubt that this magnificent piece comes from the Frankish Empire. Of similar quality are several pendants and mounts from the Viking Age. Two silver pendants and a gilt silver mount were found in the southeastern corner of the site (Fig. 7). The pendants are crafted in the knotted ornamentation of the Borre style and depict a bird seen from above. Both pieces are clearly worn from use, one more than the other. Among the spectacular examples is a very special bronze mount for which there is as yet no parallel (Fig. 8) (Wieczorek

Table 1:
Stray finds - Absolute distribution of objekts

PERIOD AD	NUMBER
375-530	2
530-700	25
700-1100	38
1100-1200	2
1200-1500	1

Table 2:
Distribution of dated coins

PERIOD AD	NUMBER
10th century	19
11th century	0
12th century	0
13-14th century	3
Post AD 1350	2

Table 3:
Type distribution and numbers

OBJEKT TYPE	NUMBER
Cruciform brooch	1
Beaked brooch	4
Equal-armed brooch (6th cent.)	4
Oval plate brooch	2
Disc brooch (6-7th cent.)	1
Rectangular plate brooch	4
Bird brooch	7
Equal-armed brooch (Vik.)	3
Tongue-shaped brooch	2
Cross enamel brooch	1
Tortoise brooch	4
Four-headed brooch	1
Trefoil brooch	3
Pendant	6
Ring pin	2
Strap mount	2
Strap buckle	1
Arm ring	1
Key	1
Gold fingerring	1
Sword pommel	4
Scabbard mount	1
Two-poled weight, iron with brass	2
Tablet shaped lead weight	6
Square-shaped lead weight	1

& Hinz 2000, Fig. 09.02.08 and 10.01.10). Parts of this mount were found on two different occasions. The first fragment was one of the masks which at the time was interpreted as a model for producing a mould or a patrix due to its very deep relief which appears rather coarse in the absence of further ornamentation (Gärtner & Ulriksen 1997, Fig. 7). The original four crown- or feather-crested bearded heads were cast in one piece within the rectangular frame. The raised centre is topped by three small bronze knobs. Direct Danish parallels for a bronze pendant made in cloisonné technique are also lacking. In the centre is an equal-armed red cross surrounded by two concentric circles in red and yellow enamel.

Fig. 7. Silver pendants in Borre style. Scale 1:1. Photo Jens Olsen.

The piece was possibly produced in Ireland/England and is one of the rarely found cross enamel pieces in Denmark (Ulriksen in print). A model for a mould for the production of a female figurine and two mould models for large beads (Fig. 10) are interesting both as artefacts and with regard to an understanding of the site's function. Silver, bronze and iron ingots occur similarly to a limited extent; there are also finds of melts of lead, bronze and silver. The world of craftsmanship is represented by weights, although these are not very abundant. Tablet-shaped lead weights are most common, whereas iron weights with a brass coating only number one polyhedral and two spherical examples. Finally, mention should be made of one convex and three triangular iron pommels with inlays of brass and babbitt which, together with a lanceolate arrowhead and a scabbard mount, represent weapons in the find assemblage.

Fig. 8. Four-headed brooch, bronze. Scale 1:1. Photo Jens Olsen.

Conclusions from the metal detector searches

The picture gained from the finds shows rather unambiguously that the site is from the Late Iron Age. There is a small number of metal artefacts belonging to the 5th century. Otherwise it is the Late Germanic Iron Age and the early part of the Viking Age which dominates. The absence of artefacts with the Late Viking styles of Urnes and Ringerike and of 11th century Danish and other Western European coins is significant. There is no doubt that the site ceased to function prior to 1000 AD.

Figure 11 shows the distribution of dated artefacts from the Late Iron Age found in the plough soil. It is apparent that the period 530-700 AD is primarily represented towards the southeast. Artefacts from 700-1000 AD have a wider distribution, but here too, it is clearly the eastern, elevated part of the site that contains most finds. The variation in the artefacts is rather great, but a mapping of the distribution of specific types reveals no areas with an over-representation of certain artefact groups .

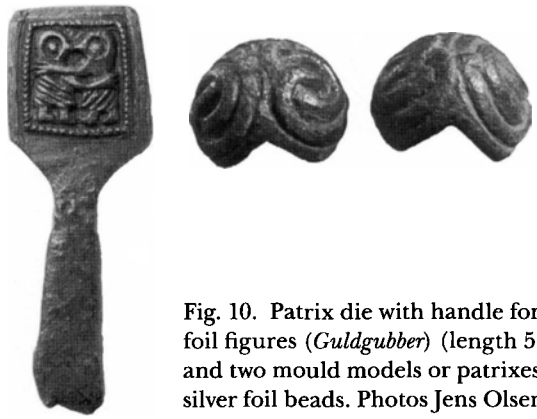

Fig. 10. Patrix die with handle for gold foil figures (*Guldgubber*) (length 5 cms) and two mould models or patrixes for silver foil beads. Photos Jens Olsen.

Fig. 9. Bronze pendant, two four-headed bronze mounts and part of a silver belt buckle. Scale 1:1. Drawings by Kristian Sørensen and photos Jens Olsen.

The site is rich in finds, including several ornaments of a high standard of craftsmanship and also of high prestige value. The relatively large number of coins, and fragments of these, is conspicuous. Similarly, the finds of bronze melt, patrixes and form models, suggest that metal handwork was among one of the functions performed at the site.

Excavations in 1997 and 1999

The following account of the excavation results from Vester Egesborg is both preliminary and brief. The finds from 1997 and 1999 have not yet been fully analysed for publication and at the point of writing (April 2000) yet another part of the site is under excavation. A final publication will be produced when the investigations of the site have been completed.

The trial excavation in 1997 was initiated because subsoiling was planned prior to a resumption of cultivation after a longer period of fallow. It was known from the investigations in 1965 that there was an intact 10-20 cm thick culture layer below the plough soil. Subsoiling to a depth of 50 cm would turn this layer upside down along with the underlying pit-houses, which in several cases only extended 20-30 cm down

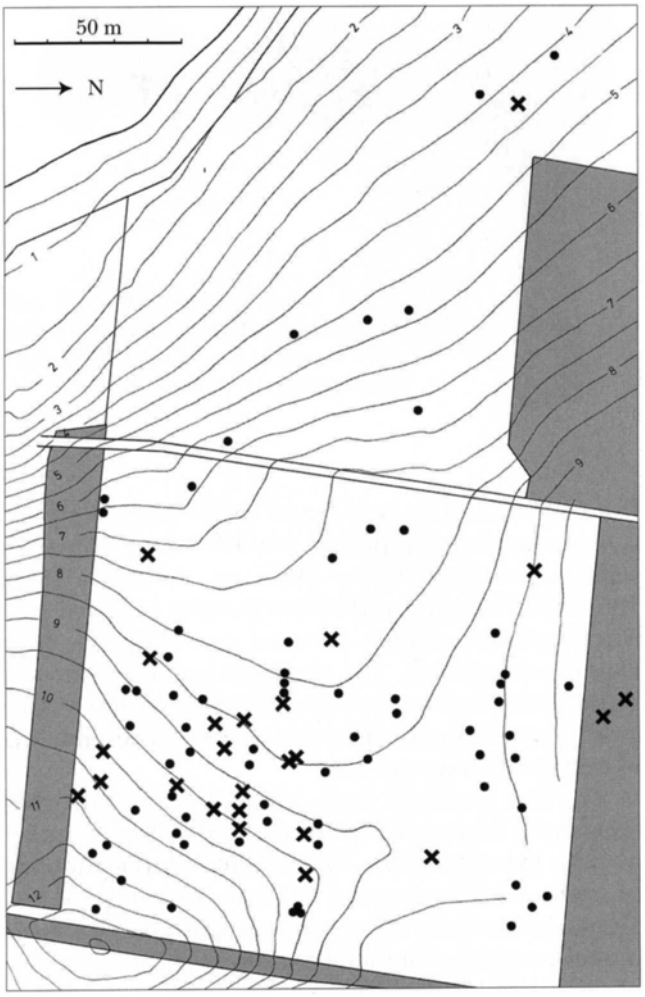

Fig. 11. Distribution of dated objects from the Late Iron Age, AD 530-700 (cross) and AD 700-1000 (dot). Drawn by the author.

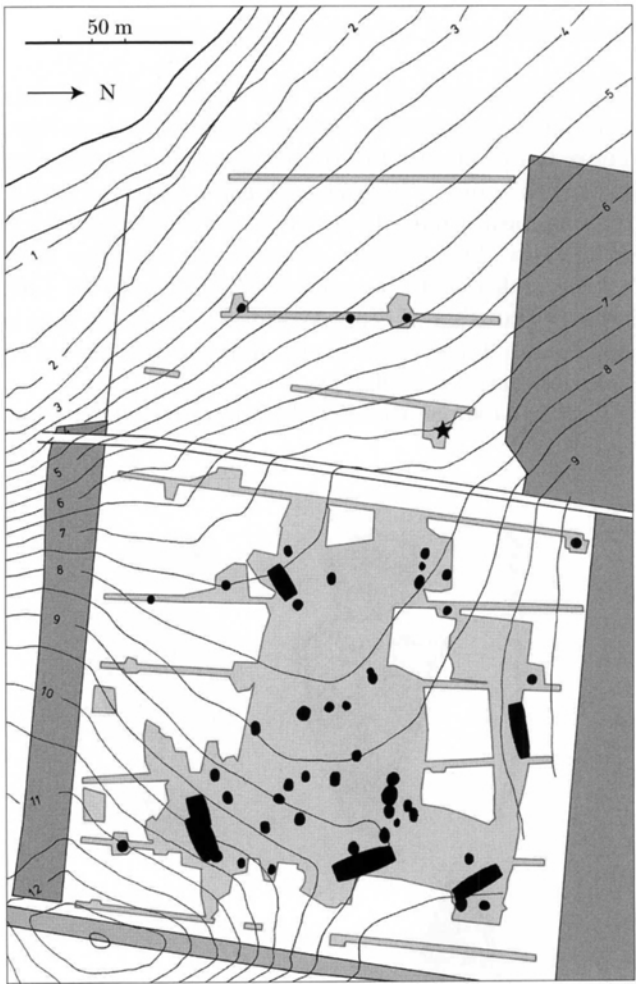

Fig. 12. The excavated area up until 1999 showing the three-aisled houses, pit-houses and an oven (star). Drawn by the author.

into the subsoil. The rich detector finds from 1996 lead to Næstved Museum contacting the Keeper of the National Antiquities and the Danish Forest and Nature Agency for a decision as to whether, in the light of this, the field should be excavated or scheduled. Despite the fact that the Danish Forest and Nature Agency decided at a very early stage that there was no economic basis for scheduling, it was determined by the authorities that a trial excavation, comprising a series of trenches, should be carried out to establish the extent and state of preservation of the site. This took place in 1997, when a three-aisled house, 16 pit-houses, a smithy and an oven were investigated. The pit-houses contained large quantities of pottery and there were also finds of several exquisite ornaments, Frankish glass, bone combs, glass beads, fragments of basalt querns and soapstone vessels. In 1999 a large area of the site's eastern part was opened up, revealing a further four three-aisled houses and 22 pit-houses (Fig. 12). The features recorded in the system of trenches suggest that there are the remains of further more pit-houses and workshops in the southern and western parts of the investigation area.

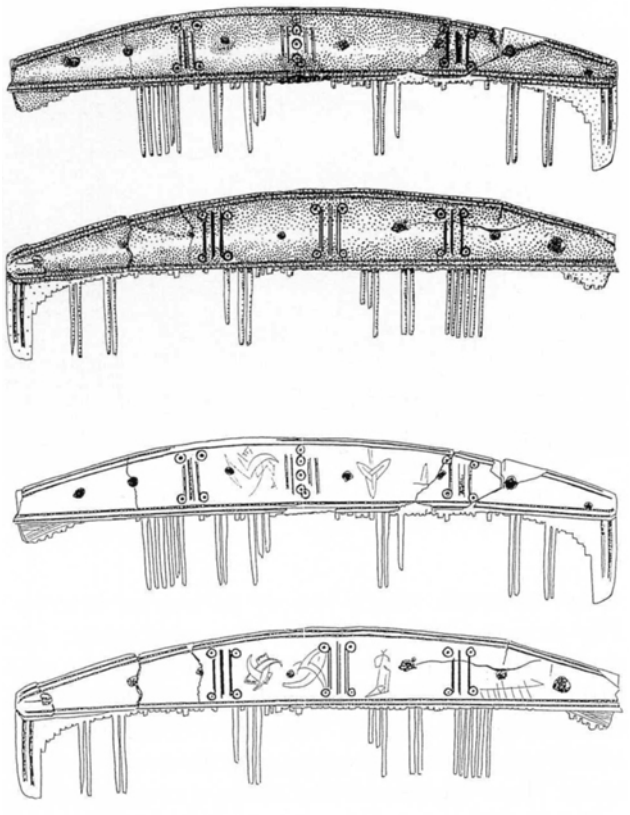

Fig. 13. One comb with decoration and fine, incised graffiti (below). Scale ca. 1:3. Drawn by Kristian Sørensen.

Fig. 14. Gilt bronze brooch and gilt bronze mount. Scale 1:1. Photos Helle Ludvigsen.

Settlement structure and dating

The overwhelmingly dominant element in the excavations was the pit-houses which were found over the whole site. There appears to be a tendency for the pit-houses to lie in unstructured clusters, but the degree to which this picture is correct cannot be determined without total excavation of the site. In the central part of the excavated area there are numerous postholes which cannot, however, be linked to give recognisable constructions. Around this "centre", six three-aisled buildings have been found, of which two are aligned more-or-less north-south, while the others have their orientation rotated in a southwestern-northeastern direction. The three-aisled houses lie rather scattered. The two north-south oriented houses lie parallel to each other some 15-20 m apart. The distance from these to the other houses is 40 to 90 m. No fences or other features which could be seen as a physical division or delimitation of the individual building units relative to each other, or to the surroundings, could be demonstrated.

Three-aisled houses

The three-aisled houses are all of modest dimensions. The largest is house 24, a north-south oriented building, 19 m long and 6 m broad at the middle. The postholes for the curved walls were relatively well-preserved. Traces of six pairs of roof-bearing posts were found, of which the two outermost stood in the straight gable. Another north-south orientated three-aisled house, house 22, with slightly curved walls, a length of about 16 m and a breadth of about 6 m was investigated nearby. There were traces of two pairs of roof-bearing posts and most of the postholes from the western wall were preserved. House 21 was aligned northeast-southwest and had well-preserved traces of curved walls. There were postholes from four pairs of roof-bearing posts, of which the outermost were drawn closer together and placed in the gables. The building was 14 m long and 6.5 m broad (Gärtner & Ulriksen 1997, Fig. 8). One house was oriented northe-

ast-southwest and had one pair of roof-bearing posts in each gable. Postholes from the walls were only sporadically preserved but the walls appear to have been slightly curved. The building was 8 m long and 5.5 m broad. The last three-aisled house was house 23 which was approximately 16 m long and 6 m broad in its oldest version. The roof had been borne by five pairs of posts, of which the outermost were drawn closer together and stood in the gables. The postholes from the south wall show that the walls of the house had been slightly curved. The later phase of the house was about 13 m long and 7 m broad with only three pairs of roof-bearing posts; the outermost pairs stood in the gables. Here too, the postholes of the southern wall were preserved showing that it had had followed a slightly curved path.

All the houses can be dated to the 8th-10th centuries but it must be emphasised that all the dates are based on typology.

Fig. 15. The oven in feature A77. Photo Jens Ulriksen.

Pit-houses

The 44 pit-houses investigated vary somewhat in size, but they are identical in design, being constructed around rounded flat-bottomed pits with a roof-bearing post in each gable. In several cases the fill was relatively homogeneous and sealed by the ubiquitous culture layer which had sunk down into the top of the pit. In some cases an actual basal layer could be recognised, but this rarely contained diagnostic traces of the activity or activities which had taken place in the house. Mention should be made of a quantity of lenticular loom weights which were largely made of unfired dried clay. The fill from the pit-houses was sieved through a 2 mm or a 4 mm net and contained a large number of finds. Potsherds were clearly dominant. The pottery comprised partly unornamented, flat-based settlement vessels with a convex, straight or flared rim, partly Baltic ware reminiscent of Middle or Late Slavic types in form and decoration. Conical and bi-conical spindle whorls of fired clay were, with a single exception, found together with the Baltic ware. Spindle whorls of sandstone, often with turned grooves, were most commonly tablet-formed, but truncated conical examples were also recovered. There were also several conical and tablet-formed spindle whorls of soapstone. Glass beads were a common find, whereas beads of rock crystal and cornelian were rare. The single combs of bone and antler included an almost intact example which was of particular interest. The ornamentation used by the combmaker was that which regularly occurs at Vester Egesborg with three to four vertical lines combined with four circles containing dots (Fig. 13). The owner of the comb had added engraved motifs using a needle or a very sharp knife. There are several triskelions of varying quality, a little lady in a dress and some scratching which may (with a little imagination) be interpreted as a ship with oars. Several of the pit-houses were found to contain dress ornaments and mounts of bronze and iron. From house 8 there is a gilt fibula, with the motif of a Nordic version of the Christian legend of "Daniel in the Lions' Den" (Fig. 14, top) (Gärtner & Ulriksen 2000). In house 1 there was a fragment of an originally larger artefact of gilt bronze with Anglo-Irish decoration, and in house 30 lay an intact tortoise brooch with gripping beast decoration. Among the other finds was a bird brooch, a polyhedral weight of iron with a brass coating, a ring-headed pin of iron, fragments of basalt querns, iron arrowheads, sherds of drinking glasses, a tessera, fragments of soapstone vessels and slag from the refining of iron and iron objects. The use of a magnet revealed, furthermore, the presence of large quantities of hammer scales and minute iron spheres, which similarly bear witness to the working of iron at the site.

Other constructions

In the northwestern part of the investigation area a large amorphous feature measuring about 5 x 7 m was excavated. The surface of the fill material was very rich in charcoal and also contained many clumps and patches of red-burnt clay. This was found to cover a stone-based oven which had been equipped with an upper part constructed of withes and clay. The inner side was red-burnt, while the outer surface was unfired. The base of the oven was characterised by light orange-red sandy powder (Fig. 15). In front of the oven was a clay floor, covered by a layer of charcoal about one centimetre in thickness. No datable artefacts were found in connection with the oven. Neither were there any remains which could reveal unequivocally the use to which the oven been put. Baking or grain-drying are obvious possibilities. A similar oven containing carbonised rye grains was found at Gl. Lejre (Christensen 1993, 54).

In the middle of the site there were two forge pits. One of these contained abundant hammer scales and forge slags while the other, in addition to the latter two elements, also contained scrap iron and vitrified soapstone.

Culture layer

This takes the form of a 5-15 cm thick black-brown sandy layer containing charcoal, innumerable fire-shattered stones and red-burnt clay fragments. Searches with a metal detector during removal of the topsoil with a mechanical excavator showed that it contained, quite contrary to expectations, only very few metal artefacts. The culture layer covers a very large part of the excavated area. Nowhere was it possible to discern any features or structures on the surface of the layer or, on subsequent excavation, within the layer itself. In several cases the layer was left intact for the purposes of sieving. In this way a handful of potsherds, a few glass beads and hammer scales were located. As there were abundant features below the culture layer and the necessary financial resources were not available for a meticulous sieving of the several hectares which it covered, it was therefore largely removed immediately, without excavation, to give an overview over the constructions on the site.

Conclusion

Evidence from the metal detector finds with regard to the age, functions and structure of the Vester Egesborg site can be summarised as follows: The majority of the finds can be dated to the period from the 6th to the 10th century AD, with a very modest contribution, comprising a few percent, from the 5th century AD. Artefacts from the 11th-12th centuries AD are absent. The ornaments and ornaments, mounts and fittings include everything from the common to the spectacular and the unique. There were finds of melted clumps of bronze and silver, whole and fragmented Kufic coins, small pieces of rolled silver rods with punchmarks, in addition to a small number of tablet-formed lead weights, all of which largely bear witness to the execution of fine craftsmanship. There is, furthermore, a good quantity of iron slag from forging processes. Sword pommels and arrowheads have also been recovered. The finds come from an area of about 2-3 hectares with a clear concentration in the eastern half. This impression has been strengthened by the results of the excavations. All of the house remains examined can be dated to the 6th-10th centuries. Traces of ironworking are striking both in the features and in the culture layer, and the many artefacts from the plough layer have been followed-up with similar finds from the pit-houses. The extent of the site has not yet been established precisely. The trenches in the western part of the investigation area also revealed pit-houses and workshop activities even though there so far are very few metal detector finds from here.

The Vester Egesborg site is indisputably located on the coast and therefore distinguishes itself from the majority of the known settlement sites from Denmark's Late Iron Age. Most of the country's coast-based sites from the period 200-1100 AD were dealt with a few years ago within the framework of a research project under the Danish National Research Foundation (Ulriksen 1998). Here the conclusion was reached that activities bound to the coast were not linked to the agrarian economy but instead were established with the intention of taking account of society's maritime interests. The basis of this conclusion was a series of excavations which showed that these landing places are characterised by pit-houses and various craft activities, whereas the typical farm with its long-house and three-aisled auxiliary buildings was absent. When the three-aisled buildings are present at this kind of site, it

is in very modest numbers, i.e. up to two-three examples, and they are distributed in a way that is inconsistent with their interpretation as farm units. Traces of the replacement of the roof-bearing construction were rarely seen. The houses' period of use appears thus to have been restricted to a single phase. From the 11th century onwards this picture changes. Craft activities and pit-houses cease to be dominant features. In some cases the settlement vanishes completely, in others a chieftain's farm with a church is established.

Seen in the light of this, there are many elements of the Vester Egesborg site which correspond to the definition of a Late Iron Age landing site. The decisive point is whether there is evidence of a coastal agrarian farm or not. This question can only be answered on the basis of the evidence from the buildings[8].

The five three-aisled houses enclose an area of about 100 x 100 m. Both inside and outside this "frame" there are pit-houses. No fences have been demonstrated which can define or connect the buildings as farm units. Neither can the number of houses which have existed simultaneously be determined. Four of the five three-aisled houses show signs of having been repaired with new walls or replacement of the roof-bearing posts, and house 23 has clearly been demolished and rebuilt with a different roof-bearing construction.

Three-aisled houses belong primarily to agrarian farms where, in the Late Iron Age, they served various functions from living quarters to outhouses. During the last 20 years many house remains from the 6th-10th centuries have been excavated on Zealand. In only one instance has such a large area been uncovered that it was certain that all the buildings which could have belonged to an individual farm within a certain time frame were documented. This procedure is essential in order to demonstrate the relationship between the main dwelling house and the auxiliary buildings. It was, for example, possible in connection with the chieftain's or royal farms at Lejre (Christensen 1993; 1997) and at Tissø (Jørgensen 2003) as well as at the find-rich settlement of Strøby-Toftegård on Stevns (Tornbjerg 1998). This picture can also be recognised at less spectacular sites such as Varpelev-Bøgelund (Tornbjerg 1992, 73ff.). In all cases it is the largest building, relative to the others, which is perceived as the main dwelling house. There are no analyses of the size of a house as an expression of its function and the basis data are still too modest for all too firm conclusions to be drawn. The special sites such as Lejre, Tissø and Strøby-Toftegård should probably not be included in a definition of the average farm on Zealand in the 6th-10th centuries. Varpelev-Bøgelund is, as such, probably more suited. Here the dwelling houses are all more than 30 m long and 6-7 m broad, while the auxiliary buildings are between 13 and 17 m long and 5-6 m broad (Tornbjerg 1992, figs. 16 & 17). At a number of other settlement excavations on Zealand from the period in question, sufficiently large areas have not been exposed to permit conclusion to be drawn as to whether it is the dwelling house or the auxiliary buildings which have been investigated[9].

Whether Vester Egesborg was a coastal farm or a specialised landing place cannot be decided on the basis of the present evidence. The longest house, with its 19 m, is not impressive relative to the buildings at Varpelev-Bøgelund. Clarification of the circumstances at Vester Egesborg is totally dependant on a total excavation of the site.

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[8] This applies to, for example, the Boeslunde complex (Nielsen 1997), Gershøj (Ulriksen 1998, 78ff.), Sigerslevøster (Kramer 1998), Svogerslev (Ulriksen 1988), Vindinge (Christensen 1992) and Værløse Vest (Nissen 1999).

[9] For a more detailed discussion of these circumstances see Ulriksen 1998.

Acknowledgements
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References

Christensen, Tom 1991: Lejre - syn og sagn. Roskilde Museums Forlag. Summary.

Christensen, Tom 1992: Gård og storgård - landsby og landingsplads. Eksempler på bebyggelsesformer i Roskildeegnens jernalder. In U. Lund Hansen & S. Nielsen (red.): *Sjællands jernalder. Beretning fra et symposium 24.IV.1990 i København,* pp. 81-90. Arkæologiske Skrifter 6. Arkæologisk Institut, Københavns Universitet.

Christensen, Tom 1993: Lejre beyond the Myth. *Journal of Danish Archaeology* vol. 10 - 1991, pp. 163-185. Odense University Press.

Christensen, Tom 1997: Lejrehallen. In J. Callmer & E. Rosengren (red.): *"...gik Grendel att söka det höga huset...". Arkeologiska källor till aristokratiska miljöer i Skandinavien under yngre järnålder,* pp. 47-54. Rapport från ett seminarium i Falkenberg 16-17 november 1995. Hallands Länsmuseers Skriftserie No 9/GOTARC C. Arkeologiska Skrifter No 17. Halmstad.

Gärtner, Birgitta & Jens Ulriksen 1997: Vester Egesborgpladsen - en anløbsplads fra vikingetid ved Dybsø Fjord. *Liv og Levn* 11 - 1997, pp. 11-14. Næstved.

Gärtner, Birgitta & Jens Ulriksen 2000: Mytens ornament. *Skalk* 5, pp. 5-9. Højbjerg.

Jørgensen, Lars 2003: Manor and Market at Lake Tissø in the Sixth to Eleventh Centuries: The Danish 'Productive' Sites. In T. Pestell & K. Ulmschneider (eds), *Markets in Early Medieval Europe. Trading and 'Productive' Sites, 650-850.* Windgather Press/Bollington, pp. 175-207.

Kramer, Finn Erik 1998: Sigerslevøster. *Arkæologiske udgravninger i Danmark 1997, lb.nr. 32,* 104. Udg. af Det arkæologiske Nævn og Rigsantikvarens arkæologiske Sekretariat. København.

Nielsen, Henning 1997: Ett regionalt rigedomscenter i Sydvestsjælland. In J. Callmer & E. Rosengren (red.): *"...gik Grendel att söka det höga huset...". Arkeologiska källor till aristokratiska miljöer i Skandinavien under yngre järnålder,* pp. 55-70. Rapport från ett seminarium i Falkenberg 16-17 november 1995. Hallands Länsmuseers Skriftserie No 9/GOTARC C. Arkeologiska Skrifter No 17. Halmstad.

Nissen, Mette 1999: Værløse Vest. *Arkæologiske udgravninger i Danmark 1998, lb.nr. 80,* 131f. Udg. af Det arkæologiske Nævn og Rigsantikvarens arkæologiske Sekretariat. København.

Tornbjerg, Svend Åge 1992: Jernalderbebyggelser ved Køge. In U. Lund Hansen & S. Nielsen (red.): *Sjællands jernalder. Beretning fra et symposium 24.IV.1990 i København,* pp. 51-80. Arkæologiske Skrifter 6. Arkæologisk Institut, Københavns Universitet.

Tornbjerg, Svend Åge 1998: Toftegård - en fundrig gård fra sen jernalder og vikingetid. In L. Larsson & B. Hårdh (eds.): *Centrala platser, centrala frågor. Samhällsstrukturen under Järnåldern,* pp. 217-232. Uppåkrastudier 1. Acta Archaeologica Lundensia, Series in 8°, No. 28. Lund.

Ulriksen, Jens 1988: Vikingehuse i Svogerslev. *ROMU. Årsskrift fra Roskilde Museum 1987,* pp. 15-26.

Ulriksen, Jens 1994: Sites and settlements with a maritime context, AD 200-1200. *Antiquity* vol. 68, no. 261, pp. 797-811. Oxford.

Ulriksen, Jens 1998: *Anløbspladser. Besejling og bebyggelse i Danmark mellem 200 og 1100 e.Kr. En studie af søfartens pladser på baggrund af undersøgelser i Roskilde Fjord.* Vikingeskibshallen. Roskilde. English summary.

Ulriksen, Jens in print: Scheibenförmige Kreuzemailfibeln der Wikingerzeit und des Mittelalter in Alt-dänemark. *Offa* 59/60.

Wieczorek, A. & Hinz, H.M. (Herg.) 2000: *Europas Mitte um 1000. Band III.* Theiss/Stuttgart

Ørsnes, Mogens 1966: *Form og stil i Sydskandinaviens yngre germanske jernalder.* Arkæologisk-historisk række XI. København.

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Debate

Settlement and Land Use at the Mesolithic-Neolithic Transition in Southern Scandinavia

by Kasper Lambert Johansen

ABSTRACT

This contribution is a critical survey and discussion of patterns of settlement and land use at the Mesolithic-Neolithic transition in Southern Scandinavia. The Ertebølle Culture (EBK) and the earliest stage of the Funnel Beaker Culture, early Neolithic I (EN I), are thoroughly examined, leading to a comparison between the two periods. It is found that our view on the settlement system of the EBK needs revision. In recent years, the EBK has been characterised according to the model of complex hunters. Large groups that live a sedentary life on big year-round base camps have been anticipated, whereas the smaller settlements have been perceived as seasonal extraction camps, exploited by task-groups radiating from a base camp. This model is considered here to be insufficient. Instead, it is proposed that EBK settlement comprised a number of small groups rotating between sites on a seasonal basis within a confined territory, but perhaps periodically aggregating at key localities. It is concluded that this settlement pattern has many organisational features in common with EN I. Further it is argued that the overall reorganisation of the settlement happened rapidly because of structural incompatibilities inherent in the two different ways of life. Relocating the actual living area to inland residential sites probably was the only stable hybrid between hunting and farming - a perspective with many implications. Thus in terms of settlement and land use, the Mesolithic-Neolithic transition is a mosaic of continuity and discontinuity. If research on this topic is considered in a historical perspective, however, continuity tends to have been overlooked since the transition to agriculture is also a collision of two very different research traditions. Usually the views are one-sided, either Mesolithic or Neolithic. Here both periods are taken into consideration, and the article is concluded with some overall thoughts on the transition to agriculture in Southern Scandinavia.

THE EBK SETTLEMENT

When compiling distribution maps of settlements and single finds of the EBK, it is clear that the sites concentrate along the coast and to a lesser degree in relation to the freshwater systems of the interior (Brøndsted 1957, 108; Jennbert 1984, Fig. 65; Nielsen 1981, 16; 1994, Fig. 2). The representativity of this pattern can hardly be questioned since it remains after years of systematic regional surveys. Coastal sites are found over most of Southern Scandinavia, either above or below the present sea level (Andersen 1985, 52). Inland settlements are known mainly from the Åmose lacustrine basin and along the stretches of the Gudenå (Andersen 1983; Andersen 1998a; Mathiassen 1938; 1943). It is probable that to some extent this reflects the archaeological focus on these areas. However, it must be of cultural significance that inland EBK sites are located primarily along the major freshwater systems.

The coastal settlement

The EBK sites are by no means evenly distributed along the coast. Fjords and estuaries, or most frequently a combination of both, mark the focal points of settlement (Andersen 1995, 45; Fischer 1997, Fig. 11). This is unlikely to be coincidental, since fjords with freshwater outlets are expected to have been the most productive resource spaces in the late Atlantic environment (Andersen 1995, 42ff.). Thus in terms of potential human food resources, the fjords have been characterised by

high productivity, great diversity, high overall stability and a low degree of seasonality (Paludan-Müller 1978, 124ff.).

On the open coast only few settlements are found - a fact that may be ascribed to the less favourable resource situation and to the more exposed environment. However, heavy erosion combined with a lack of investigations has certainly contributed to an under representation of sites (Skousen 1998, 60ff.). Outside the fjords narrow straits and small islands may have been common places for settlement. Thus Sejerø, off the coast of North-western Zealand, has many late EBK sites (Kempfer-Jørgensen & Liversage 1985, 27). Generally they are small though, perhaps primarily reflecting the seasonal exploitation of resources like breeding seals and birds (Paludan-Müller 1978, 131).

Based on the Bjørnsholm investigations, Andersen distinguishes between six locations of sites within a fjord: settlements on headlands, settlements at the mouth of a lagoon between opposing headlands, settlements at river outlets, settlements on islands, mainland settlements facing an island, and settlements on beach ridges facing an exposed coast (S. H. Andersen 1993, 61; 1995, 47). By emphasising the proximity of the settlements to narrow straits and stream channels, Fischer presents a similar picture of the typical distribution of sites within a fjord (Fischer 1997, 66). Thus, the pattern seemingly repeats itself regardless of which fjord system one observes (Andersen 1994, Fig. 3; Johansson 1995, Fig. 5; 1999, 58ff.; Petersen 1984, 8). To explain these topographical choices, good opportunities for stationary fishing clearly were of crucial importance (Fischer 1993a, 19ff.; Johansson 1995, 92; 1999, 60).

Regarding the size of EBK coastal settlements, estimates of site size in Roskilde Fjord and Bjørnsholm Fjord may indicate the existence of two categories of settlements. There are a large number of sites that cover less than 50x50 m, and a few sites with approximately the same width, but with a length of up to 350 m (Andersen 1995, Fig. 5). However, these two groups are not really separated. The range in settlement sizes forms a continuous spectrum with the vast majority of sites being on the smaller end of the range. Thus, the average settlement sizes in Roskilde Fjord and Bjørnsholm Fjord are 33x16 m and 59x27 m respectively (Andersen 1995, Fig. 5). The larger sites especially are characterised by the topographical features outlined above, whereas there is more variation in the position of the smaller sites (Johansson 1995, 92; 1999, 60). In Bjørnsholm Fjord, the Bjørnsholm midden is the only really large settlement, the remainder of the sites seemingly being smaller (S. H. Andersen 1993, 61). This constellation of one large and several smaller settlements has been proposed as a general model for fjord systems of comparable size (Andersen 1995, 48; 1998d, 102; Fischer 1997, 74). However, given the current state of publication, the pattern can hardly be confirmed, and some observations may point in a less clear-cut direction (Andersen 1976, 37ff.; Johansson 1995, figs. 4-5; 1999, 59ff.).

In analogy with complex hunters, the patterns in distribution, size and faunal assemblage of EBK coastal settlements have been perceived to indicate sedentism. The vast coastal sites are typically seen as a result of large corporate groups that live a steady life in the same place on a year-round basis. On the other hand, the smaller settlements are viewed as seasonal extraction satellites, exploited by task-groups radiating from a base camp (Andersen 1990, 36; 1998d, 102; Fischer 1997, 64ff.; Jennbert 1984, 97ff.; Madsen 1987, 231ff.; Rowley-Conwy 1983, 118; 1985b, 188). The base camp itself is marked by a cemetery, proclaiming the right to this important resource space through a system of lineal descent (L. Larsson 1984, 34ff.). This conception of the EBK settlement system has gained wide acceptance in recent years, and it has in many ways become the fundamental theoretical framework of all discussions on how and why agriculture was introduced in Southern Scandinavia.

Ertebølle and Bjørnsholm are among the large coastal settlements interpreted as permanently occupied base camps because their assemblages contain faunal remains from nearly every season (Bratlund 1993, 103; Rowley-Conwy 1983, 122; Madsen et al 1900, 81ff.). Upon closer inspection of the published bone material from Bjørnsholm, though, the vast majority of the terrestrial mammals seem to have been killed during the warmer half of the year. Indicators of winter settlement are for the most part limited to a number of bird species and fur animals (Bratlund 1993, 100ff.). That fur hunting was mainly an activity of the late fall and winter is highly plausible, but the occurrence of fur bearing species on summer camps has been documented (Persson 1989, 104). Shellfish were evidently gathered during the summer (Brock & Bourget 1991, 9; Jensen 1982, 10). Likewise fishing, a vital activity at both sites, seems to have been conducted in late summer or autumn, fitting the general pattern of summertime coastal fishing in the late Mesolithic (Enghoff 1983, 94; 1987, 74; 1991, 49; 1993, 116; 1994, 83ff.).

To sum up the evidence, the primary activities at Bjørnsholm and Ertebølle fall in the summer half of the year, whereas indicators of winter settlement are seemingly more sparsely represented. Other large coastal sites have also recently been demonstrated to be of a more seasonal nature – that is if we are not just witnessing the result of an effective delayed return system (Mahler 1981). Skateholm I seems to be a settlement of the cold season only, whereas the bulk of faunal remains from Tybrind Vig may be ascribed to summer and autumn (Rowley-Conwy 1998a, 198; 1998b, 90).

Nevertheless, it is a fact that several seasons are often represented in the faunal assemblages from large coastal sites

(Madsen et al 1900, 175). Still, it is considered here to be highly questionable whether this indicates regular sedentism. Large coastal EBK sites have an enormous chronological span, often encompassing up to 1000 ^{14}C years (S. H. Andersen 1992, 73; 1995, 50). As the bone material from such a long sequence is collapsed into one seasonal evaluation, it is only to be expected that the entire yearly cycle can be documented. A long-term accumulation of seasonal occupations may just as well have caused the pattern to arise.

The vast areas covered by some coastal EBK settlements have also been used to argue for a permanent year-round occupation of a large group (Rowley-Conwy 1983, 120). However, the size of the sites may instead reflect a heaping up of debris from numerous small seasonal occupations over a long period of time. Once again, the longevity of the large coastal settlements must be taken into consideration. The ^{14}C-datings from Ertebølle have a range of 6010±95–5070±90 bp (K-4318, K-4307), whereas Bjørnsholm covers the time span from 6090±100–4760±90 bp (K-5304, K-5721) (S. H. Andersen 1993, 70-76; Andersen & Johansen 1987, 59). Further, Norslund, Tybrind Vig and Dyrholmen are just a few examples of the many large coastal settlements that encompass the whole typological sequence of the EBK (Andersen 1985, 55ff.; Andersen & Malmros 1966, 93; Mathiassen et al 1942, 33ff.). Andersen believes that the occupations at Bjørnsholm were few, but extensive (S. H. Andersen 1993, 73). Hence it is characteristic that kitchenmiddens from time to time display sections of intensive accumulation inter-spaced by periods with virtually no deposition (Andersen & Johansen 1987, 49). Evaluating the rate of deposition in large kitchenmiddens is, however, extremely difficult. Most excavations have been done in sections, which makes the horizontal accumulation almost impossible to monitor. Nevertheless, there are many indications that large kitchenmiddens must be regarded as palimpsests of countless smaller shell heaps (Andersen & Johansen 1987, 45; Madsen et al 1900, 20). If these shell heaps, as suggested by the ^{14}C-sequences, have accumulated with varying intensities over a great expanse of time, the conception of kitchenmiddens as the settlements of large sedentary groups may need revision.

When the range of activities at large kitchenmiddens is examined, the stability of activities through time is remarkable. Besides typo-chronological variation, the tool assemblage remains largely the same throughout the deposits. Likewise the same animal species are found in comparable proportions from top to bottom (Andersen & Johansen 1987, 44; Enghoff 1987, 68; 1993, 113; 1994, 78). Also the fireplaces that seemingly were the focal points of all activities are regularly uncovered in stratigraphic sequences. This indicates that they were relatively fixed through centuries of exploitation (S. H. Andersen 1991, 25; 1993, 78; Andersen & Johansen 1987, 48). Collating the evidence, it is therefore obvious that large coastal settlements are products of an incredible stable settlement pattern where the same activities were carried out at the exact same localities throughout hundreds of years. In the case of Ertebølle and Bjørnsholm, emphasis was clearly placed on eel fishing and gathering of shellfish in late summer and autumn, although these activities were performed in the context of a broad-spectrum exploitation of the catchment area (Bratlund 1993, 101; Enghoff 1987, 74; 1993, 106). Winter occupations were seemingly less pronounced and the faunal remains may primarily reflect the use of the sites for hunting birds and fur animals.

The presence of cemeteries in conjunction with large coastal sites is among the discoveries that have had a great impact on the notion of sedentism in the EBK (Albrethsen & Petersen 1976; L. Larsson 1984; 1995, 96). However, this correlation is very problematic. First of all, the settlement-cemetery complexes all date to the late Kongemose/early Ertebølle transition, whereas the graves from late EBK are few, scattered, poorly furnished and give an impression of 'ad hoc' burials (Andersen 1995, 51; Nielsen & Petersen 1993, 77). Ironically, there are no burial grounds from late EBK, the period from which the largest settlement sites are known. Whether Bøgebakken and Skateholm I are cemeteries in the sense of the word has also been questioned (Meiklejohn et al 1998, 205). The burials are recognised as oblong pits in the actual settlement area, found among features like fireplaces, postholes and pits. At Vedbæk, graves are found at almost every settlement, and the correlation may be as simple as the longer the chronological span of the site, the higher the number of burials (Meiklejohn et al 1998, 205). Clearly, a formal disposal area for the dead was not set up as a demarcation of a groups' right to a site occupied on a year round basis. On the contrary, both Skateholm I and Gøngehusvej are seasonal sites (Larsson 1995, 99; Rowley-Conwy 1998a, 198). However, if the deceased were more or less buried where they died, the accumulations of burials do point to a stable pattern of settlement rotation. The nearly 80 graves excavated at Skateholm I may indicate a relatively large group. If the chronological span of the settlement is taken into consideration, though, this figure cannot account for even a family unit (Larsson 1995, 99).

The lack of dwelling structures presents another problem. If large groups lived at big coastal sites on a year-round basis, complexes of huts or houses would be expected. To pursue this matter further, the topsoil has been removed behind a number of kitchenmiddens, the result being negative in every case. If huts did indeed exist at these locales, they have left no traces (S. H. Andersen 1991, 17ff.; 1993, 65ff.; Andersen & Johansen 1987, 35ff.). In general, only a few possible dwellings are known

from the EBK, and they have been recorded at both small and large settlements (Sørensen 1995, 28). So far no complexes of structures have been discovered, but this may to some degree be attributed to the methods of excavation. If huts are indeed to be found beneath the kitchenmiddens, as was the case at Lollikhuse, larger areas will have to be exposed.

To give a representative presentation of the smaller coastal sites is difficult, since the research has been focused on larger settlements (Andersen 1975a, 9; 1979, 7; Skousen 1998, 29ff.). Aggersund, Vængesø and Rønbjerg Strandvolde are small settlements, and they probably represent only one or a few episodes of occupation by a small group (Andersen 1979, 15ff.; Andersen 1975a, 14; Skousen 1998, 54). The faunal records from Aggersund and Vængesø resemble the assemblages from larger coastal sites, yet Aggersund is distinguished by a high number of whooper swans and at Vængesø many whalebones were discovered (Andersen 1975a, 44; Møhl 1979, 58). A number of other sites also contain faunal assemblages that in addition to commonly encountered species are distinguished by one or very few species figuring more prominently than is usually the case. Thus, Ølby Lyng has high frequencies of harp seal and common porpoise, and at Hjerk Nor fur animals are abundant (Hatting et al 1973, 17; Møhl 1971, 46).

All sites mentioned above are seasonal, and they have been interpreted as specialised extraction camps, exploited by task-groups living permanently at large base camps elsewhere (Andersen 1990, 36; 1998d, 102; Madsen 1987, 231ff.; Rowley-Conwy 1983). However, the tool assemblages do not differ significantly from the composition at larger sites, either in terms of the types present or with respect to their relative frequencies (Andersen 1975a, 16; 1978, 42; Petersen 1971, 8ff.; Skousen 1998, 44). Roughly identical activities and activity areas are documented, and in spite of the variations in the faunal records, all sites testify to a broad-spectrum pattern of exploitation. Hence these settlements clearly represent the day-to-day living activities of a small group and not a specialised exploitation by task-groups. Emphasis was, however, placed on one or a few species abundant at the respective localities during the given season.

The small coastal sites are considered here not to be much different from larger coastal settlements. In fact, the only real difference may be that the resources on which the sites were based were not stable through time. Probably the small coastal sites did not gain the impressive size of the larger coastal settlements situated in areas with rich and stable resources, because the resource situation did not allow resettlement for centuries.

Bridging the gap between small and large coastal settlements are sites like Norsminde (Andersen 1991; 1994). Both in terms of composition and structure, Norsminde resembles the larger kitchenmiddens. Thus the site is an accumulated settlement with a chronological span in the EBK layers of approximately 700 ^{14}C-years (Andersen 1991, 29). It has gradually gained its present appearance by the heaping of small piles of debris around fireplaces horizontally fixed through time (Andersen 1991, 21). The modest size of the site, combined with its long life span, may indicate that it was not settled by larger groups of people, although considerable portions of the midden were deposited within 2-300 ^{14}C-years. The pattern of exploitation seemingly remained fairly constant throughout the whole period of settlement. Thus, gathering of shellfish and fishing for cod and flatfish during the summer must have been among the most important activities (Andersen 1991, 22; Enghoff 1991, 45).

To conclude the coastal settlement of the EBK, it can be stated that in recent years there has been a consensus on interpreting the patterns in topography, size and character of the sites as indicating sedentism. The big coastal settlements are perceived to be the result of large groups living in the same place throughout the whole year, whereas the smaller sites are viewed as seasonal extraction camps, exploited by task-groups radiating from a base camp (Andersen 1990, 36; 1998d, 102; Fischer 1997, 64ff.; Madsen 1987, 231ff.; Rowley-Conwy 1983, 118).

In having worked through the evidence, this model is considered here to be hard to defend. Small coastal sites are numerous, even though they have rarely been subject to study. When analysed, they seem to reflect the day-to-day living activities of a small group settled seasonally in order to exploit one or two resources, however still drawing heavily on the general catchment area. In itself, this indicates that people probably did not spend all year at one locality. One cannot neglect that large coastal sites, when considered single units, generally have faunal remains from several seasons. However, their chronological span renders it impossible to say that this factor implies actual sedentism. Thus, in terms of settlement size, it is tempting to see the differences as a continuous spectrum, expressing varying degrees of accumulation in the form numerous smaller seasonal occupations over shorter or longer periods of time. Instead of an apparent gap between small and large settlements, a range of variation is noted. It extends from small seasonal sites, occupied maybe only once by a small group (Vængesø), to moderately accumulated localities like Norsminde, to the large coastal settlements such as Bjørnsholm and Ertebølle, which often span a millennium. It is argued here that the basic unit in the settlement pattern of the EBK is the small group glimpsed at sites like Rønbjerg Strandvolde. It is also found that the larger settlements exist mainly as products of a stable pattern of rotation, adapted to a very reliable resource situation. Obviously people returned

to the same spot throughout centuries to perform a relatively fixed range of activities, specifically associated with the given locality.

As mentioned, there is a strong correlation between the location of the larger coastal sites and the best areas for stationary fishing (Johansson 1995, 92; 1999, 60). Excellent conditions for fish weirs must be the basis of why some sites were utilised through such immense periods of time, thereby gaining their impressive size (Andersen 1995, 52). However, fishing at these key localities may during certain parts of the year have been productive enough for the sites to host short time aggregations of the fjord's population. Perhaps this is the reason why rapid and relatively extensive episodes of accumulation are sometimes observed in the stratigraphy of the kitchenmiddens, and such settlements may therefore have been quite important socially. In the remainder of the year, though, it is argued that dispersed settlement of several smaller groups within a fjord, rotating between sites in a very fixed pattern, are the dynamic most likely to have generated the archaeological evidence presented so far. Judging by the topography of the sites, the movements were probably somewhat related to the variable productivity of the different fishing grounds, although other seasonal resource concentrations must have been crucial (Fischer 1993a, 21ff.). However, every excavation testifies to the fact that apart from these resources determining the location of the site, a broad range of background resources was always exploited.

The inland settlement

The sites of the interior are mainly found in relation to larger freshwater systems, often in the form of lakes connected by rivers that have their outlets in fjords. The absence of sites associated with smaller streams and pools, or settlements scattered in the forest, may partly be attributed to a lack of investigations. Nevertheless, the scarcity of food resources in such areas must be the primary cause of the lack of sites. In this respect, larger freshwater systems present more favourable living conditions. This ecotone is characterised by high productivity, high overall stability and a great diversity of plant and animal species. However, there are seasonal fluctuations in the food supply and the winter may have been a relatively meager period (Paludan-Müller 1978, 127ff.).

Work in the Åmose basin and on Funen suggests that the majority of inland EBK sites date to the later half of the period (Andersen 1977, 10ff.; Fischer 1993b, 59). Even though many localities are known, the settlement is clearly less pronounced than along the coast. The sites are generally smaller and there are fewer of them (Andersen 1995, 48; Fischer 1997, 64).

The Åmose investigations offer an opportunity to study the topography of sites associated with a larger lake, presumably on a fairly representative basis. Here the settlements cluster on headlands and islets that offer access to the stream channels of the lake. Many sites are found adjacent to narrow straits, especially at the river inlet in the eastern part of the basin. In terms of soil type, slightly less than half of the sites are situated on peat, whereas the remainder of the sites are found on sand (Andersen 1983, 178ff., Fig. 17, 20 & 22). Along the Gudenå, corresponding observations have been made. Here too, the sites are found on sandy terraces close to river inlets and outlets in lakes, on promontories and islets, and at river junctions (Mathiassen 1938, 36). This pattern seems to be generally applicable to the inland settlement of the EBK.

Dimensions of inland settlements have been published for 11 sites in the Åmose basin and 6 in the Ringkloster area (Andersen 1983, 175; Andersen 1998a, 21ff.). Although conclusions cannot be drawn from such a small sample, the majority of sites seem to have a length of 10-40 m and a width of 4-10 m. A few sites have lengths of up to 120 m, yet the width remains fairly unaltered. The bulk of the smaller settlements are situated on peat, whereas the larger sites are found primarily on the sandy moraine.

Among the smaller inland settlements of the EBK, very few have been published. General surveys are found in the literature, but only selected aspects of a number of the sites have been thoroughly presented (Andersen 1983; Enghoff 1994, 85ff.; Fischer 1985; 1993b; Mathiassen 1943; Noe-Nygaard 1983; 1995; Stafford 1999). However, the localities generally resemble each other in terms of topography, tool assemblages, faunal records, seasonality and size, and a compiled description based on single observations from several sites may be generated.

The smaller settlements are generally situated on peat and the faunal remains suggest one or a few occupational episodes in the warm season (Noe-Nygaard 1995, 266ff.; Enghoff 1994, 88). Evidently a small group of people, perhaps merely an extended family, lived there during this time (Fischer 1993b, 61). Food was brought to the settlements, prepared and consumed, and there is evidence of the production and use of many different tool types (Noe-Nygaard 1995, 268; Stafford 1999, 69ff.). Dwelling structures may have been recorded, and adjacent to some sites fish weirs have been discovered (Andersen 1983, 35; Enghoff 1994, 88). The bone materials testify to the exploitation of a wide range of resources in the catchment area. Thus, at Præstelyng, hunting of large game, birds and fur animals are well documented, as is the gathering of molluscs and hazelnuts (Noe-Nygaard 1995, 77, 145, 148). Fishing must have been among the primary activities at the settlements, since the culture layers often to a high degree consist

of scales and bones from species such as pike, cyprinids and perch (Enghoff 1994, 85ff.; Fischer 1993b, 60; Noe-Nygaard 1983; 1995, 169).

To characterise the larger inland settlements situated on the moraine is difficult because practically all such localities in the Åmose and along the Gudenå are mixed. Thus Ringkloster remains the only site of interest (Andersen 1975b; 1998a). Here the living floor covers approximately 3000 m^2, the staggering amount of flint forming numerous concentrations. Chronologically, the site encompasses the whole EBK sequence, but occupational episodes of EN date are also documented. Ringkloster gradually gained its size through more than a millennium of settlement, although the locality certainly was used most intensively during late EBK. Fireplaces, pits, ditches and postholes were found in abundance, perhaps indicating the presence of dwelling structures. Investigations of the faunal assemblage have narrowed the season of occupation to the period November-May, but the site seems also to have been used sporadically at other times of year. Wild boar, pine marten and red deer were the predominant preys (Rowley-Conwy 1998b, 89ff.). Fishing was probably less important, but the discovery of a fish weir is in accordance with the location of the site to the south of a narrowing between two lake basins (Enghoff 1998, 102ff.). The pattern of exploitation appears to have remained fairly constant throughout the duration of the site (Andersen 1998a, 51).

If the inland settlement is perceived as an isolated phenomenon, a settlement pattern of small units living dispersed along the freshwater systems during the summer can be envisioned. A wide range of resources was exploited, but as witnessed in the faunal records and the positioning of the sites on the very shores of the basins, fishing was probably the most important activity. During the winter, the rising water must have forced people up on the moraine, although they were still keeping close to the shore. Hunting was probably of greater significance now. Most summer settlements are small which likely reflects their position on the peat. This surface is flooded every winter and is constantly changing appearance in the course of the overgrowing of the basins. Such factors must have made it difficult for the small group to return to the same spot on a persistent basis. However, if at least some of the larger sites on the moraine are winter camps like Ringkloster, their size and longevity point to very stable patterns of settlement and exploitation. These large sites may be products of a small group returning to the same spot throughout long periods of time, a perspective which agrees with the more fixed and confined topographical features of such locations. Nevertheless, it cannot be ruled out completely that these settlements were aggregation camps.

The relation between inland and coast

Two fundamentally different relationships between inland and coast can be perceived: the existence of two separated populations functioning in a context of contact and exchange, or one single population with seasonal movements between coast and inland (Andersen 1998a, 54ff.).

^{13}C-measuments of human bones from inland and coastal settlements would bring some clarity, but human remains have yet to be discovered at inland sites. At coastal localities, ^{13}C-values indicate that marine resources constituted the far greater part of the diet, perhaps between 70 and 90 % (Meiklejohn et al 1998, 207ff.; Tauber 1981, 332). Hence, if coastal populations exploited inland sites, resources procured here must have been of only marginal importance to subsistence, especially if the terrestrial contribution of the coastal stretches is taken into consideration (Madsen 1987, 232).

In lieu of human remains, ^{13}C-values of dog bones have been included in the discussion. Presumably such figures indirectly reflect the dietary habits of humans, since domestic dogs feed on human 'left-overs', and tooth marks from dogs are frequently encountered in the bone inventories (Noe-Nygaard 1995, 187). On the coastal sites of Sølager and Maglemosegårds Vænge, measurements show a predominantly marine diet (-14.74 & -14,70 $^{o}/_{oo}$ respectively), whereas the specimen from the inland site of Præstelyng has a terrestrial value (-21.60 $^{o}/_{oo}$). However, the correlation is far from that simple. The dog from the coastal site of Ølby Lyng has a terrestrial rating (-23.52 $^{o}/_{oo}$). Further, one of the four dogs from Ringkloster shows a marine value (-11.8 $^{o}/_{oo}$) in contrast to the other three that have lived mainly on terrestrial resources (-18.8, -20.0 & -21.3 $^{o}/_{oo}$) (Andersen 1998a, 50ff.; Noe-Nygaard 1983, 137ff.; 1988, 88ff.).

Given the lack of a clear pattern, these data sets have been seen as being of little use in the debate on the inland-coast relation (Rowley-Conwy 1998b, 92ff.). However, the fact that the results are polarised probably suggests the existence of two separated populations, where the 'overlapping finds' may be understood in the light of exchange (Noe-Nygaard 1988, 91). Caution must be taken, though, when dealing with such indirect evidence, since multiple intervening factors may be at work. For instance, the terrestrial values may be ascribed to the hunting/trapping of feral dogs for fur.

Ringkloster is of great significance in the discussion of the inland-coast relation because marine indicators have been found at this settlement: 3 bones of dolphins, 13 oyster shells, (2 amber beads) and 24 bones of marine fish species (Andersen 1998a, 46ff.; Enghoff 1998, 102ff.; Rowley-Conwy 1998b, 89). Similar observations have been made at other inland localities, but coastal indicators at such sites are very rare (Andersen

1997, 52; Petersen 1973, 87ff.).

There are several other interesting aspects of Ringkloster. The bone element representations of wild boar, red deer and aurochs clearly indicate that portions of meat were removed from the site. Likewise, the large number of pine marten bones is remarkable. Along with the juvenile roe deer and red deer, they may indicate specialised hunting for furs and skins (Rowley-Conwy 1998b, 94ff.). The relative frequency of tool types also differs significantly from that of coastal sites. There are many scrapers, angle burins, denticulate pieces and arrowheads, and only few borers, truncated pieces and flint axes. Antler axes are numerous, and there are many indications of antler working. On the other hand, there are only few bone tools, excluding the extraordinary number of shoulder blades from which bone rings have been cut. The amount of pottery is unusually large, and the material includes ornamented sherds resembling finds only from Norsminde Fjord and Brabrand Fjord (Andersen 1998a, 31ff.).

On the basis of these characteristics, Ringkloster has convincingly been interpreted as a specialised hunting/trapping camp, visited seasonally for shorter periods of time by hunting parties from one or several coastal areas (Andersen 1998a, 55; Rowley-Conwy 1998b, 96). However, roughly the same patterns may be generated as a result of intensive exchange (Madsen 1987, 233; Andersen 1998a, 55). In this respect, it is worth noticing that Ringkloster is among the EBK settlements in Denmark having the largest number of features on the living floor. Perhaps this indicates the presence of dwelling structures (Andersen 1998a, 26). The anthropogenic changes of the forest and the remains of a fish weir also point to more long-lived activities (Andersen 1998a, 52; Rasmussen 1998, 82). There are clear indications of tool production and use, and in spite of the export of meat, game certainly was consumed on site (Rowley-Conwy 1998b, 95). The tool inventory differs from that of coastal settlements - apparently an indication of a diverging range of activities. Nevertheless, this does not in itself imply that Ringkloster is specialised, some features of the flint assemblage being typical coast-inland differences (Stafford 1999, 121). The range and relative proportion of animal species may also agree well with the game actually available in the Ringkloster area during the cold season.

If such observations are taken into consideration, it seems obvious that Ringkloster is not just a locality visited by a hunting party for a few days every year, as has been suggested by Rowley-Conwy (1998b, 96). Given the impact on the area, people must have lived on the site for quite some time during each visit. However, whether Ringkloster is part of an inland settlement system or a site resulting from transhumance in the coast-inland trajectory during the winter remains inconclusive. If the first model is applied, the export of meat, furs, skins, bone rings and perhaps antler may be seen as an expression of exchange relations with coastal groups, through which fish, sea mammals, oysters, (amber) and perhaps ceramics were acquired. The ^{13}C-values of the dog bones agree with this model, and the site may be seen both as a settlement of an inland population and the locus of intensive contact and exchange.

The nature of the relation between inland and coast at Ringkloster cannot immediately be resolved, as is the case with the question of inland and coastal populations in general. It is evident that small groups were living along the freshwater systems during the whole summer, but elucidating what happens in the winter seems impossible. If at least some of the larger sites on the moraine are winter camps like Ringkloster, they are numerous enough for one to argue for a solitary inland population. However, even if these are winter settlements, they may still be part of a pattern of seasonal movements between coast and inland at work throughout the year.

In terms of the food supply, it may be expected that at least parts of the population living inland during the summer would leave for the coast in the cold season. On the other hand, the large stocks of wild boar and the excellent conditions for fur hunting may periodically have pulled people in the opposite direction, since most coastal fish seek deeper water in the winter. The resource asymmetry may also have constituted the foundation of exchange networks. In this case, a far more fluid relation, with diffusion of both population groups and goods between coast and inland may have existed if such movements were not conflicting territorial behaviour.

However, the discussion of inland and coastal populations may altogether be misleading. The settlement patterns have without a doubt varied regionally, being adapted specifically to the unique topography of the given area. In some regions like Northern Jutland, the late Atlantic landscape offered practically no geographic 'depth', and for that reason the sporadic evidence of hinterland exploitation may well have to be seen in relation to the pronounced coastal settlement (S. H. Andersen 1992, 71). On the other hand, in the Åmose system and along the Gudenå one can easily picture a regular inland population.

Territorial behaviour

The view presented so far on the settlement system of the EBK diverges from actual sedentism, as conceived in the model of complex hunters. However, the settlement pattern has been treated as if it operated in relative isolation within fairly limited space, a scenario strongly suggested by stylistic studies.

In terms of regional variation in material culture, there are obvious differences between Eastern and Western Denmark. West of the Great Belt, T-shaped antler axes, bone rings, bone combs, bird points, straight harpoons, heart-shaped paddles, sheaf ornamented organic implements and denticulate pieces are found. On Zealand and in Scania, Limhamn axes, curved harpoons and elliptical paddles were in use (Andersen 1981, Fig. 8; 1987, 104ff.; 1997, Fig. 23; 1998b, 19; Jensen 1994, 53ff.; Petersen 1984, 13ff.). However, taking a closer look at Scania and Zealand, there are dissimilarities in the early EBK burial custom, both in terms of the position of the body, the character of the grave goods and the treatment of the dead (Larsson 1989, 213). Likewise, the Scanian harpoons are distinguished by having ornamented barbs, and there are some differences in the ceramics from the two areas (Andersen 1997, 60; Jennbert 1984, 138). All this may imply that the greater stretches of water functioned as cultural barriers which were only occasionally crossed, or perhaps that not all influences were welcomed and incorporated in the local tradition.

Within these larger areas, stylistic variation has also been observed. Along the eastern coast of Zealand, at least three different regional groups can be discerned on the basis of flake axe morphology and technology (Petersen 1984, 16). Recently, this study has been complemented and it may now be possible through examining stone tool assemblages to distinguish no less than five regional groups on Zealand within the late EBK (Johansson 1999, 49ff.). Eastern Jutland is characterised by an abundance of ornamented organic tools from early EBK, and the Limfjord area is among other things distinguished by a diverging flint technology (S. H. Andersen 1993, 81; 1998b, 19ff.; 1998d, 104). The ornamented pottery from Ringkloster, Brabrand Fjord and Norsminde Fjord may also constitute a solitary regional group (Andersen 1998a, Fig. 39). Even local styles can be differentiated. Hence, the technological traditions at Ertebølle and Bjørnsholm clearly differ even though the sites are contemporaneous, show a similar range of activities, have roughly the same raw material supply and are located only some 8 km from each other (S. H. Andersen 1993, 80ff.; Andersen & Johansen 1987, 52).

This evidence does not in itself denote actual sedentism, but it certainly indicates that movement was confined to very small territories. The regional differences in material culture may point to limited measures of communication across territorial boundaries, or perhaps to a strong group awareness expressed in an active use of material culture for signifying identity. This perception of settlement systems operating permanently within small areas conforms to the stable patterns of exploitation at individual sites. Likewise, the incidents of violence in the anthropological material must be understood within this territorial frame of reference (Bennike 1985, 98; Persson & Persson 1984, 48).

It may be possible to consider the flake axe groups of Zealand and the ceramic group of Eastern Jutland as areas in which marital exchanges took place (Rowley-Conwy 1998a, 200ff.). It may primarily be within such isolated populations that a certain style can be maintained, although it is acknowledged here that the correlation of style and ethnicity is usually far from that simple (Hodder 1982, 187ff.). It is interesting, though, that roughly corresponding to the flake axe groups, differences in cranial metrics have been reported (Meiklejohn et al 1998, 209). This may support the idea of marital networks being expressed by stylistic differences in material culture. Ethnographic studies indicate that groups require between 500 and 1000 people to maintain themselves as biological and functional isolates, figures that may approximate the minimum number of inhabitants in such areas (Meiklejohn et al 1998, 208; Rowley-Conwy 1983, 116; 1998a, 200). However, in the case of high Atlantic Southern Scandinavia, characterised by very productive and stable resources, several smaller groups, each holding their territory, can be expected to have existed within these networks (Rowley-Conwy 1998a, 200). Perhaps this is how the stylistic differences between Ertebølle and Bjørnsholm should to be considered. It may then be reasonable to suggest that the settlement systems of the EBK unfolded primarily within individual fjords, perhaps at the size of Bjørnsholm, Norsminde and Vedbæk, where population figures of 60-80 individuals have been proposed (Petersen 1984, 16; Rowley-Conwy 1983, 116). Interaction must primarily have taken place within such areas or within the marital networks. However, the largely unified image of the EBK and the evidence of long distance trade do imply that the individual groups were far from isolated (Fischer 1983; Klassen 1999).

The settlement of EN I

The overall land use in EN I can be investigated through an examination of distribution maps of artefacts, settlements and burial structures, characteristic of the regional groups Oxie, Svenstorp, Svaleklint, Stengade II/Siggeneben Süd and Volling (M. Larsson 1984; Madsen 1994; Madsen & Petersen 1984; Nielsen 1985).

In terms of flint axes, pointed-butted axes of type I-III and thin butted axes of type I-IIIa are chronological markers of EN I, whereas the thin butted axe of type IV seemingly encompasses the whole early Neolithic period (Hernek 1988; Midgley 1992, 269; Nielsen 1977). Each regional group is characterised by a ceramic inventory. The Volling group is problematic in this respect because it clearly extends into EN

II in Northern Jutland (Madsen & Petersen 1984, 99). Further, it is troublesome that the ceramics of EN I in parts of Southwestern Denmark are relatively unknown. The Satrup group of Northern Germany may be relevant to this issue, the finds being incorrectly placed in EN II due to the vertical stripes on the belly (Kristensen 1988, 32ff.).

Burials from EN I are known in the form of non-megalithic earthen long barrows and simple inhumation graves (Ebbesen 1994; Madsen 1979; 1993). In Eastern Denmark, the non-megalithic earthen long barrows are mostly dated to EN I, whereas in Jutland they were clearly constructed through the whole EN (Kristensen 1988, 37). However, when investigating land use in EN I, it is of great help that the barrows associated with early Volling ceramics have been isolated (Kristensen 1988, map 2).

Distribution maps of these find categories are found in various publications (Brøndsted 1938, 131; Hernek 1988, figs. 4-7; Kristensen 1988, map 2; 1991, Fig. 1; Midgley 1992, Fig. 32; Nielsen 1977, figs. 7-8, 12, 16a-b; 1994, figs. 3, 6). Clearly a compilation of these maps forms a mixture of hoards, votive depositions, settlements, graves and single finds. However, the earthen long barrows in particular may be excellent indicators of settlement if they, like megalithic graves, functioned as territorial markers (Chapman 1981, 71ff.; Renfrew 1976, 198ff.). This is underlined by the fact that culture layers are regularly found during the process of excavating such structures, just as pollen analysis of the sealed soil surfaces often indicate fields and pastures (S. Th. Andersen 1993; Madsen 1979, 317). Likewise, votive depositions and hoards have been shown to occur relatively close to settlement areas (Ebbesen 1982, 60ff.; Koch 1998, 139ff.). The value of single finds can be questioned, but they nevertheless indicate human activity in the area.

Studying these distribution maps without taking notice of the geographic allocation of the different regional groups it is apparent that nearly every part of the landscape was in use. Thus on Zealand and in Scania, the coastal zone was exploited, but judging by the finds of ceramics and flint axes, the main focus was on inland areas. In Scania it is remarkable how few of the supposedly earliest pointed-butted axes (type I) that are related to the coast. Pointed-butted axes are primarily found along the freshwater systems of the interior (Hernek 1988, 219; Jennbert 1984, 111).

Jutland is much harder to evaluate. Artefacts and structures associated with the prevailing Volling tradition can for the most part only be assigned to the EN in general, and large parts of Southern Jutland are terra incognita in EN I. Mid-Jutland is probably somewhat comparable to Zealand and Scania. However, taking the location of the early Subboreal coastline into consideration, there may be a tendency towards a more coastal orientation in Northern Jutland. The pattern seems real, but it may have its genesis in an uneven research focus.

The residential sites

Skaarup's division of EN I settlements into residential sites and catching sites is considered here largely to be valid (Madsen 1982, 201ff.; Madsen & Jensen 1982, 81ff.; Nielsen 1993, 92ff.; Skaarup 1973, 11ff.). The topography of residential sites has been examined through a number of regional surveys. In Eastern Jutland, it has been demonstrated that the sites have following characteristics: they are primarily placed on sandy soil but within areas displaying a great diversity of soil types, they are situated in low lying areas relatively close to wetlands or streams, and the majority of sites are found less than 3 km from the coast (Madsen 1982, 226; Madsen & Jensen 1982, 76ff.). On Bornholm, where 65 localities are known from EN I, comparable observations have been made. Here the sites are also found on sandy soil, often focused on small hills, close to fresh water, and with a wide range of other soil types in the catchment area. The settlement concentrates around 5 km inland (Nielsen 1997, 119ff.).

In terms of topography, the Scanian sites agree completely with the Danish material (M. Larsson 1984, 194ff.; 1985, 62ff.; 1992). However, in the Southwest Scanian investigation area, the bulk of residential sites are found in the hilly landscape more than 10 km inland, a fact that may be explained by a coastal plain consisting exclusively of heavy clay. Perhaps this indicates that light soils and wetlands were parameters of greater importance than the proximity to a coastline (M. Larsson 1984, Fig. 1, 194ff.; 1985, 62ff.). In the Ystad area, some of the EN I sites are associated with a lagoon, but here the soil is sandy, permitting settlement close to the coast (Larsson 1992, 78ff.). Altogether, this corresponds to the distribution maps of artefacts and structures datable to EN I, indicating that both coastal and inland areas were settled. The close proximity of the East Jutland sites to the coast may be seen as a regional difference, but the small sample size and the uneven research focus are clearly decisive factors (Torsten Madsen, personal communication).

The average size of residential sites is difficult to determine because only few localities have been excavated in total. Generally, EN I sites are recognised as conglomerations of a few pits, postholes and fireplaces in addition to smaller areas with culture layers (Larsson 1985, 13). Mosegården is among the settlements that can be considered relatively intact. At this site the scatter of flint and ceramics covers only 5-600 m^2 (Madsen

& Petersen 1984, 71). Comparable sizes have been recorded for the other EN I sites in Eastern Jutland, and they correspond to the extent of the early Volling settlement behind the Bjørnsholm midden (S. H. Andersen 1993, 65; 1994, 17; Madsen 1982, 205; Madsen & Jensen 1982, 68). Settlement sizes have not been published for the localities on Bornholm, but here the bulk of EN I sites are referred to as 'small' (Nielsen 1997, 119). In the Ystad area, the two settlements at Mossby have an extent of 450 m^2 and 300 m^2 respectively. Kalshem has been estimated to be somewhere around 2-300 m^2, whereas Kabusa IVb covers 600 m^2 (Larsson 1992, 80ff.). In Danish material the three settlements at Skræppekærgård, each encompassing 400 m^2, and the site of Topperøgel, amounting to 600 m^2, represent localities of similar size (Hansen & Hansen 1988, 97; Kaul 1988, 105ff.).

On the basis of this group of unmixed settlements, 500 m^2 is considered here to be the average size of residential sites in EN I. However, there are several larger settlements and some scholars imply two categories of residential sites (Skaarup 1982, 42). Havnelev covers 20.000 m^2, Stengade II 1.300 m^2, 'Stengade vest' 5.500 m^2, Oxie maybe 10.000 m^2 and Svenstorp more than 1.600 m^2 (Nielsen 1994, 297; Skaarup 1985, 348; Larsson 1985, 88). Likewise Lindebjerg, Värby, Hyby and Barkær are fairly large settlements (Liversage 1981, 145; 1992, 29ff.; Larsson 1985, 88). The implications of such sites are almost impossible to evaluate. Do they represent an accumulation of smaller occupations over many years? Are we monitoring a long-lived permanent settlement of a small group? Or do the sites indicate a short-term settlement of a large group? Certainly some of the sites are mixed, but generally the bulk of material dates to EN I. On the other hand, EN I encompasses more than half a millennium, so the chronological resolution is clearly insufficient. However, given the existence of a relatively homogeneous group of unmixed settlements measuring 500 m^2, the far more heterogeneous large settlements are considered here to be accumulations of smaller sites. Perhaps Lindebjerg exemplifies this, since stylistic differences in the ceramics have been observed between different areas of the site (Liversage 1981, 130). This may be perceived as being of chronological significance, thus pointing to several episodes of occupation.

Based on Barkær (and Stengade II), the residential sites of EN I have been viewed as villages with around fifty families living collectively in two long houses (Glob 1949, 11; 1976, 19; Skaarup 1975). Later these structures have convincingly been reinterpreted as long barrows, leaving open the question of houses in the early Neolithic (Madsen 1979, 306ff.; Liversage 1992, 17ff.). Only recently, a regular house type from this period has been discovered. It is recognised as a 10-18 m long, 4-6 m wide, oval/rectangular structure with a single row of 3-8 roof supporting posts, and a wall construction of wattle-and-daub (Eriksen 1993, 11ff.; Kaul 1988, 105; Larsson 1992, 67). The number of inhabitants in such houses, covering on average around 70 m^2, can be estimated to be somewhere between 7 and 12 on the basis of Naroll's, Casselbury's and Cook & Heizers' formulas (Casselbury 1974; Cook & Heizer 1968; Naroll 1962). These figures are clearly of a theoretical nature, however they do indicate that one should probably consider an extended family as the realistic social unit. Further, Mossby, Karlshem, Skræppekærgård and Topperøgel suggest that only one, or perhaps two, such houses are to be expected at settlements in the order of 500 m^2 (Hansen & Hansen 1988, 97; Kaul 1988, 105ff.; Larsson 1992, 60ff., 66ff.).

The duration of occupation presents another problem. Based on the quantity of ceramics and an estimated group size of 15 individuals, a range of 3-10 years has been suggested for Mosegården (Madsen & Jensen 1982, 69). Again these calculations are speculative, and multiple intervening factors may be at work. However, they do imply that the individual occupations generally only lasted a few years.

The topography of the residential sites is difficult to grasp if hunting, gathering and fishing were the primary activities. On the contrary, the sandy soil must have offered dry conditions for settlement and a surface easily worked for agricultural purposes. Likewise the forest may have been more open than on heavier soils, making clearance a manageable task (Larsson 1985, 62ff.). The agricultural activities at the residential sites are illustrated through the presence of charred grain, grain impressions in ceramics, grinding stones and sickles (Nielsen 1985, 110; Hjelmqvist 1975, 211ff.; Larsson 1985, 90; Skaarup 1975, 140). The crops seem primarily to have been naked barley and emmer, but einkorn, chaff barley, club wheat and bread wheat were also grown (Robinson 1994, 22ff.). Ard marks beneath burial mounds have thus far only been documented from EN II and onwards (Thrane 1991, 118).

As for the scope of agriculture, it presumably was not large at this early stage. The finds of sickles are few, and their use wear is light compared to later periods of the TRB (Jensen 1994, 149ff.). Pollen analysis also points in this direction. From the ^{14}C-dated sequences, it is evident that Iversen's Landnam roughly coincides with the beginning of EN II, leaving, besides the elm decline, next to no indication of agricultural activities in the regional diagrams of EN I (Göransson 1994, 174; Madsen 1990, 29ff.). The elm decline is considered here to be a primary consequence of elm disease, although human influences may have had a triggering effect, at least in some areas (Göransson 1994, 172; Madsen 1990, 28; Rasmussen 1998, 80).

Clearances in EN I have been indicated via in-situ pollen diagrams of fossil soil surfaces sealed beneath the earthen

long-barrows of Bjørnsholm, Rude and Bygholm Nørremark (S. Th. Andersen 1992; 1993, 161ff.). They testify to an opening of the primeval forest, with or without the use of fire, followed by an interval of intensive grazing. Likewise burning of secondary birch forest with the aim of growing cereals has been documented. These two strategies probably formed the elements in an integrated system of land use, combining grazing/browsing and swidden agriculture in a cycle running over a number years (Jensen 1994, 95). However, since this pattern of exploitation had hardly any impact on the general composition of the forest, the clearances must have been local and of small scale (S. Th. Andersen 1993, 171).

Herding of domesticated animals at residential sites is documented in faunal remains preserved at a few localities (Møhl 1975, 207ff.; Nielsen 1997b, 237; Nielsen 1985, 110; 1994, 297ff.). Cattle, pig and sheep/goat are present, but the small samples lend no indication as to their relative importance. Hardly any wild animals are found in the assemblages, emphasising that husbandry and agriculture were the primary activities at the residential sites. Husbandry is generally held to have been of greater importance than agriculture – a plausible statement given the few indications of cereal growing (Madsen & Jensen 1982, 82).

As for the topography of the residential sites, the more open vegetation on the sandy soil may have benefited the grazing of cattle and sheep/goat. Likewise the extensive areas of wetland must have met the significant demand of drinking water associated with husbandry (Skaarup 1985, 349). From an ecological point of view, pigs may be expected to have been of greatest importance among the domesticated animals, because this species is naturally adapted to a forest environment. Thus in the low-lying areas dominated by oak, pigs probably could have been raised with minimal effort (Madsen 1982, 222ff.). However, the location of residential sites at junctions of a wide range of soil types must also have presented excellent opportunities for drawing on natural resources. At the juncture of such different ecosystems, the diversity and density of wild plants and animals may have been quite high (Larsson 1985, 68).

The catching sites

Although possibilities of hunting, gathering and in some cases maybe even fishing were present in the general vicinity of many residential sites, catching sites clearly figure as an integrated part of the settlement system in EN I. These sites are situated on the beaches along the coast and on the banks of the inland freshwater systems (Madsen 1982, 203). The faunal assemblages are completely dominated by wild animals, and shellfish seem to have been important in some areas (Skaarup 1973, 118).

In Eastern Jutland it has been shown that the coastal catching sites are found mainly at narrow straits or close to the stream channels of the fjords (Madsen 1982, 203ff.; Madsen & Jensen 1982, 81ff.). In Norsminde Fjord, the EN I catching localities are all situated along the deepest channel, either on sandy headlands jutting out from the northern shore, or on Kalvø bordering up to the stream channel from the south (Andersen 1976, 42). The catching sites in Bjørnsholm Fjord are found close to the mouth of the fjord where the water is more nutrient (S. H. Andersen 1993, 61). Altogether, this indicates that the topography of the EN I coastal catching sites corresponds closely to the pattern of EBK coastal settlement. Most EN I coastal catching localities are in fact stratified sites with lower EBK layers capped by sequences of Neolithic occupations. The EBK sites probably were formed as a result of people settling in areas having excellent opportunities for fish weirs and the exploitation of other marine resources. Clearly the same applies to the EN I coastal catching sites.

The average size of the sites is almost impossible to determine. The impression is that most EN I coastal catching localities are small, and the layers are noticeable thinner than the corresponding EBK horizons (S. H. Andersen 1991, 15; 1992, 73; Madsen 1982, 204; Madsen et al 1900, 176). However, sites like Bjørnsholm and Visborg have EN I layers stretching over more than a hundred or several hundred meters respectively, reflecting a high degree of variability (S. H. Andersen 1993, 69; 1998c, 12).

Among the coastal catching sites, only kitchenmiddens have been thoroughly investigated. Generally, the layers have a composition markedly different from EBK middens. There are fewer shellfish, and the dominating species are cardium and common mussel. The amount of oysters has in most areas decreased substantially by EN I compared to the EBK layers (S. H. Andersen 1992, 75). Instead, the Neolithic horizons are made up of large amounts of fire cracked stones, ashes, charcoal, dark sand, burnt flint and a burnt as well as crushed shell matrix (S. H. Andersen 1991, 23; Madsen et al 1900, 137, 176). These are the components of numerous inter-stratified thin, yet relatively extensive layers. Features and structural remains are few, and even the fireplaces are rather diffuse. Thus only rarely have the activities been organised around fireplaces fixed in space through time. Micro-debitage indicating in-situ flintknapping is seldomly encountered, and the density of flint is generally very low. Instead, a large amount of pottery is a characteristic feature of EN I kitchenmiddens (S. H. Andersen 1991, 23; 1993, 73).

These observations emphasise that the kitchenmiddens

are probably no longer settlements in the actual sense of the word. What we see may only to a small degree be day-to-day living activities. Rather, the bulk of evidence points towards an extraction strategy based on batch exploitation of resources available in the vicinity of the site during the given season. Thus, the omni-presence of fire and the many potsherds may be perceived as evidence of conserving fish, shellfish and perhaps other resources (Madsen 1987, 235; 1991, 491).

When the faunal remains from stratified coastal sites are examined, it is evident that roughly the same composition of species is found in the Mesolithic and the Neolithic horizons. In the EN I layer at Sølager, swans and different species of ducks dominate, whereas roe deer, red deer and wild boar respectively are the most common terrestrial mammals. Among the few fish bones, flatfish and cod are represented. This corresponds closely to the range and relative frequency of species in the EBK layer (Skaarup 1973, 77). In the small sample from the EN I horizon at Bjørnsholm, roe deer, red deer and wild boar are dominant, just as swans and fur animals are documented (Bratlund 1993, 103). In terms of fish species, eel prevails and altogether this agrees well with the faunal assemblage from the EBK strata (Enghoff 1993, 107).

There are two important differences, though. First of all, domesticated animals are present at the EN I catching sites. However, at no locality do they constitute more than merely a fraction of the total number of identified fragments, and they may be interpreted as provisions brought to the sites from elsewhere (Koch 1998, 152; Skaarup 1973, 117). A more interesting observation is the general lack of fish bones at Neolithic coastal catching sites (S. H. Andersen 1992, 77; Madsen et al 1900, 147). Whereas the composition of species at such localities may give the impression of a general broad-spectrum pattern of exploitation, some activities were clearly more essential than others. Judging by the topography of the sites, stationary fishing may be expected to have been far more important than the hunting of terrestrial mammals. This agrees with the significant number of Neolithic fish weirs that have been discovered in recent years (Pedersen 1997, 142). In the EBK horizons at Bjørnsholm, Ertebølle and Norsminde, the amounts of fish bones are staggering. However, in the Neolithic shell-layer at Bjørnsholm, fish bones are relatively rare, and at Norsminde only a single specimen has been documented (Enghoff 1991, 45; 1993, 117). In the Mesolithic strata at Bjørnsholm, Norsminde and Ertebølle, fish bones are usually found in patches around fireplaces, a phenomenon probably related to episodes of cooking. This has yet to be observed in Neolithic layers (Andersen 1991, 23; Andersen & Johansen 1987, 47). Since the Neolithic shell-layers are found closer to the surface, the scarcity of fish bones may be attributed to a higher degree of taphonomic loss. However, the significance of differences in preservation between the EBK layers and the EN I layers has been questioned with respect to the fish bone assemblages (Enghoff 1991, 48; 1993, 117). A general decline in fishing at the Neolithic coastal catching sites has therefore been anticipated (S. H. Andersen 1992, 77; 1995, 52). However, this makes the topography of such localities hard to grasp. There seems to be no logical reason to move to these sites in order to hunt terrestrial game. In terms of the catchment area, the hunting of land mammals would seem to be a background activity compared to the exploitation of marine resources, fish in particular. Thus, the lack of fish bones may with caution be seen in relation to the extraction attributes of the coastal catching sites in general, the fish being caught, conserved and brought somewhere else for consumption.

The EN I catching sites of the inland freshwater systems have often been documented in the form of Neolithic elements at EBK localities (Andersen 1983, 133ff.). Therefore the topography of the settlements resembles that of inland EBK sites. People settled on headlands and islets close to narrow straits and stream channels. Settlements were situated on peat and sandy moraine areas, the peat localities perhaps being dominant due to the closing up of the basins (Andersen 1983, 182).

In terms of settlement size, sites situated on peat generally seem to be small, rarely covering more than 100-200 m^2 (Fisher 1985, 173ff.; 1993b, 62ff.; Skaarup 1973, 118ff.). The EN I components at the larger mixed sites on the moraine are more difficult to evaluate. However, Neolithic elements at such settlements generally seem to be few and scattered (Andersen 1998a, 48; Mathiassen 1943, 35ff.).

Muldbjerg I is practically the only published inland catching site from EN I, and it may be considered a representative example only with a great deal of caution. It was situated on a peat islet, and the size and character of the assemblage suggest one or a few episodes of occupation (Troels-Smith 1954, 27). The faunal remains indicate that the locality was used in the months between April and September (Noe-Nygaard 1995, 264ff.). Roe deer and red deer prevail among the terrestrial game, whereas only few bones of wild boar were found. Beaver, otter and water vole are well represented, and ducks, swans, coots and storks were commonly hunted. In the large fish bone sample, pike dominates, and shellfish, berries and nuts were gathered in the vicinity of the site. Domesticated animals comprise only 2 % of the faunal assemblage and such remains may be viewed as provisions brought to the site from elsewhere (Noe-Nygaard 1995, 76, 145ff., 168).

The composition of species at Muldbjerg I closely resembles that of Præstelyng (EBK) and a host of other similar localities in the area (Enghoff 1994, 86). Further, the pattern of marrow fracturing is roughly identical at the two settlements, and the

flint tool assemblage at Muldbjerg I hardly deviates from that of other transition-aged sites in the Åmose basin (Noe-Nygaard 1995, 282; Stafford 1999, 111). A fish weir and a dwelling structure were discovered (Troels-Smith 1957, 25ff.). Combined with the evidence of tool production and food consumption, this may simply reflect day-to-day living activities at Muldbjerg I (Noe-Nygaard 1995, 268). Thus, Noe-Nygaard makes no mention of resources being procured, processed and brought away from the locality.

As to the seasonality of EN I catching sites, Skaarup considered the coastal localities mainly to be winter camps, whereas the inland sites were perceived as having been visited only during the summer (Skaarup 1973, 133ff.). Combining the evidence from Bjørnsholm, Norsminde and Sølager, though, it is clear that coastal sites were in use throughout the year (Andersen 1991, 37; Bratlund 1993, 103; Skaarup 1973, 117). The peat localities, found in relation to the freshwater basins, were obviously only visited during the summer. Nevertheless, if the EN I horizon at Ringkloster is to be comprehended as a continuation of the EBK pattern of exploitation, this site may have been used primarily during the cold season. The same goes for other inland settlements situated on the moraine, and therefore the catching sites of EN I were probably exploited occasionally throughout the year.

Towards a settlement pattern in EN I

The exact nature of the relation between catching sites and residential sites is difficult to determine. However, the few domesticated animals at catching localities and the discovery of seal bones at Havnelev clearly indicate that the two categories of sites functioned within the same overall system (Nielsen 1994, 301).

As argued above, the coastal catching sites may be perceived mainly as extraction camps where resources were procured, conserved and brought to the residential sites (Madsen 1991, 491). Thus, at the residential sites one could expect to find a mixed faunal assemblage, consisting of both domesticated and wild species. This does not seem to be the case, though. Here the lack of wild animals is striking enough for Koch to imagine an ideological boundary between the wild and the domesticated (Koch 1998, 153). Such symbolism may have led to the disposal of wild animal remains at places other than the residential site. However, the lack of wild animals may also be attributed to the insignificant amount of faunal remains that have so far been recovered from these settlements. Likewise, one has to consider which products could have been transferred from the coastal catching sites to the residential sites. It has been argued that there is no logic in moving to the coast in order to hunt terrestrial game given that the populations were not depleted in the vicinity of the residential sites due to over-exploitation. The clearances around the residential sites may in fact have benefited the two deer species, and wild boars must have roamed the low grounds close to the settlements. The terrestrial mammals at the coastal catching sites may thus be seen only as a bonus, at least partly consumed on the spot, whereas the extraction strategies seem to have targeted fish, sea mammals, birds and shellfish. However, if conserved fish was the main resource brought back from the coastal catching sites, it is quite evident why catching activities are typically not found at the residential sites. Fish bones at this type of site stand absolutely no chance of preservation (Pedersen 1997, 141).

Because the faunal remains, due to uneven chances of preservation, provide little insight into the relative importance of the two categories of sites, ^{13}C-measurements have to be relied upon. In this respect, it is remarkable how terrestrial the EN I readings are, even though relatively few results are available from the centuries around the transition (Tauber 1981, 332ff.; 1993, 41). If these values do in fact reflect reality, the contribution from the coastal catching sites must have been fairly limited. Thus, the coastal catching sites may be seen primarily as a result of episodic exploitations of predictable seasonal resource concentrations. This agrees well with the general character of the EN I coastal catching sites. Most of them are small and have thin culture layers, and the larger sites may be regarded as accumulations of smaller occupations.

The contribution of husbandry and agriculture versus terrestrial game, freshwater fish and wild plants is impossible to evaluate. One could imagine that hunting, trapping and freshwater fishing would have gained greater importance as a consequence of the settlement spreading over the interior parts of the landscape. In this respect, however, it is remarkable how few wild animals have been found at the residential sites, if the faunal assemblages from these locales can at all be considered significant. However, it is not unthinkable that a few wild boars are concealed among the bones of domesticated pigs, given the difficulties of differentiating between the two species. Expectations of finding domesticated pigs at localities having topographical parameters of residential sites may to some degree have biased the results. The same applies to the relationship between aurochs and domesticated ox in areas where the former is still present during early Sub-boreal time (Rowley-Conwy 1985a, 77).

Nevertheless, Muldbjerg I clearly indicates that terrestrial game and freshwater fish were exploited. However, it apparently also shows that large portions of these resources were consumed at the catching locality. It may be that life in this case

consisted of a more continuous fluctuation between catching locality and residential site, both places pointing to day-to-day living activities (Noe-Nygaard 1995, 268). This pattern diverges from the relationship thought to have existed between coastal catching sites and residential sites.

In spite of these peculiarities, however, there can be little doubt that the residential sites were the actual living areas during EN I, whereas the catching localities generally have the characteristics of satellites. Husbandry and agriculture probably did not permit the abandonment of the residential sites for long, and perhaps only fractions of the population went to the catching localities (Madsen & Jensen 1982, 84).

Another aspect of this discussion is the geographic relation between the two categories of sites. In the course of excavating areas behind the kitchenmiddens of Bjørnsholm and Norsminde, small EN I culture layers were discovered (S. H. Andersen 1991, 17ff.; 1993, 65ff.). Based on these observations, one locality consisting of a coastal midden/activity area (a coastal catching site) and an upper residential area (a small residential site) has been perceived as the rule of settlement in the earliest Neolithic (Andersen 1994, 34ff.; Andersen & Johansen 1992, 54). However here, a few years have been considered to be the realistic lifespan of small EN I residential sites, and this does not correspond to the several hundred years of exploitation reflected in the Neolithic shell layers (S. H. Andersen 1991, 29; 1993, 75). Certainly a residential site and a coastal catching site sometimes merged into one locality when the characteristics of landscape allowed the existence of the two sites in the immediate proximity to each other. However, given the mobility of EN I residential sites and the fact that most residential sites and burial mounds are found further inland (Madsen 1987, 234), it may have been the exception rather than the rule.

In general, the catching sites may be regarded as fixed in space, their location being determined by an optimal resource supply (Madsen 1991, 492). On the other hand, the residential sites have a more mobile character, the settlement frequently being relocated over shorter or longer distances. Clarifying whether such movements were made on a linear basis or if the individual sites rotated within a given territory is almost impossible. However, it may be of importance that settlement debris and pollen-indications of fields and pastures are common findings when EN I burial mounds are excavated (S. Th. Andersen 1993, 161ff.; Madsen 1979, 317). If the earthen long barrows, like megalithic graves, functioned as territorial markers, they may indicate that the residential sites rotated within a marked out territory the rights to which were exclusively in the hands of the local group(s) (Chapman 1981, 71ff.; Renfrew 1976, 198ff.). In a 0.6 km^2 area by Sturup in South-western Scania, 7 Oxie residential sites have been discovered (Larsson 1985, 99). One settlements moving around within a confined territory may have generated this pattern. In the Ystad area, the two EN I sites at Mossby were found within 50 m, and the two residential sites at Kabusa were discovered only 350 m from each other (Larsson 1992, 30ff., 44). In Danish material, the three Svaleklint settlements at Skræppekærgård, observed with internal distances of 25 m, closely parallel the Swedish observations (Kaul 1988, 105). Perhaps it is also within this framework that the larger EN I sites are to be comprehended. Certainly they may be products of cyclic movements within a territory - a pattern of mobility that agrees with slash-and-burn as the primary agricultural technology. In this perspective the votive depositions in bogs are interesting. There is a high degree of continuity at the respective offering localities, and sometimes regular platforms were erected. These are observations that may indirectly suggest settlement stability (Koch 1998, 143ff., 161ff.).

In concluding the discussion on the EN I settlement pattern, it may be reasonable to state that the residential sites rotated within confined and demarcated territories (Larsson 1992, 77). On the other hand, only few burial mounds are directly associated with coastal catching localities - a fact that has been taken to indicate general accessibility (Madsen & Jensen 1982, 81, 84). Hence, the seasonal extraction activities may at some sites have been performed as a corporate effort of several neighbouring groups, rendering such localities important institutions of social integration during a time when the settlement was quite dispersed. A similar level of social significance probably cannot be attached to the smaller inland catching sites that seemingly show signs of another exploitation strategy. Perhaps these sites were more centrally located in the territories and merely used on a day-to-day basis by the local group.

Settlement and land use across the Mesolithic-Neolithic transition

To monitor settlement and land use across the Mesolithic-Neolithic transition is a difficult task for many reasons. From a culture-historical perspective, it is evident that marked changes at this point happen rapidly, and this makes the actual transition period almost invisible in the archaeological record (Madsen 1987, 235). However, the archaeological research tradition also contributes significantly to these obstacles. The continuum of time is divided into periods according to the rate of change, producing a comprehensible past that allows research to take place. These periods, which are really archaeological constructs, are for the most part studied in a relatively isolated

manner by researchers specialising in a particular interval of time. This no doubt enhances our knowledge of the respective periods. On the other hand, it also makes the transition from one period, studied by one group of experts, to another period, studied by another group of experts, exceedingly hard to grasp. Little information flows across the chronological boundaries, thereby rendering results incompatible and blurring correspondences that may in fact exist. Clearly, lines are drawn where marked cultural changes take place, but this research methodology certainly highlights the differences even further (Petersson 2000, 10ff.). Hence, in terms of the transition to agriculture in Southern Scandinavia, most research has been undertaken from either a Mesolithic or a Neolithic point of view (Klassen 2000, 4). Here an attempt will be made to trace patterns of settlement and land use across this partly culture-historical and partly research-historical boundary.

In terms of the coastal settlement, both similarities and differences are apparent. First of all, there is a marked degree of topographical continuity. The same localities were chosen in both the EBK and in EN I, most EN I coastal catching sites having been discovered in the course of excavating EBK settlements. The similarity in site topography points to an exploitation of a similar range of resources at the respective localities, a fact supported in the faunal assemblages. Hence, if the same localities were chosen for the exploitation of a comparable range of resources, the procurement technology probably also remained identical. However, the coastal catching sites of EN I are generally smaller and there are fewer of them. Thus in EN I, the intensity of coastal settlement is reduced compared to the EBK. Likewise, the treatment of the resources is different in EN I, pointing to a significant shift in the character of the sites. We probably no longer observe the remnants of base camps. Rather, the evidence seem to denote an extraction strategy based on batch exploitation of seasonal resource concentrations, the resources being processed and brought to the residential sites for consumption (Madsen 1991, 491).

It is difficult to evaluate the settlement related to the freshwater systems of the interior, since only few sites have been published. It is clear, though, that here too, there is a high degree of topographical continuity across the transition (Andersen 1983, 193ff.). If transition aged sites in the Åmose are compared, they are located identically in the landscape, and they have roughly the same flint tool assemblages (Stafford 1999, 111). Præstelyng and Muldbjerg I are both short-term localities, perhaps only occupied for a single season by a small group. The faunal records indicate occupations from April to September and the compositions of species are fairly similar. The patterns of marrow fracturing are almost identical at the two sites, and large parts of the consumption probably took place at the site locale. In sum, no major changes in the activities or the general character of these settlements seem to have occurred. Thus, if the few sites available for study can be considered representative, there truly is a high degree of continuity across the Mesolithic-Neolithic transition in terms of exploiting the inland freshwater systems.

However, some differences are apparent. First of all, the intensity of settlement seems to decrease through time (Andersen 1983, 202). Another peculiar observation is that the votive depositions are often closely associated with EN I catching localities, perhaps pointing to a changed significance of this type of resource exploitation (Koch 1998, 142ff.). There are a few discoveries that have been taken to indicate a late Mesolithic offering tradition related to the inland freshwater systems, but generally they do not seem very convincing (Karsten 1994, 166ff.; Koch 1998, 157ff.). No doubt, the genesis of a regular offering tradition in the freshwater systems coincides with the transition to agriculture. Still, it is remarkable how many of the earliest votive depositions that have been found in proximity to EN I inland catching localities - sites that are obviously deeply rooted in the Mesolithic tradition. Perhaps this reflects a changed line of thought where the offerings are to be viewed as attempts to 'domesticate' natural resources (Koch 1998, 148). Nevertheless, the spatial association of inland catching sites and votive depositions clearly does not prove that the two phenomena are related.

Based on the decreased settlement density at the coast and along the freshwater systems, it comes as no surprise that a new category of sites appears with the outset of EN I. It may seem that the few and generally small residential sites of the earliest Neolithic are unable to compensate for the significant reduction of activity in the EBK core areas. In dealing with the question of where all the hunters went, however, the small residential sites must be the answer. The distribution maps of artefacts, sites and structures associated with EN I clearly show that the gravity of settlement, at least on Zealand and in Scania, rapidly shifted to the interior parts. That relatively few EN I residential sites are known today must be attributed to the fact that the sites are small and contain few artefacts, just as the settlement probably was quite dispersed. Further, the topography of the sites makes them much harder to locate than the predictable EBK settlements, and they are very exposed to the destructive forces of cultivation. Thus, methodologically, EN I residential sites are extremely difficult to detect, especially if ceramics are not preserved, and they may be expected to be highly under represented.

In Northern Jutland there probably is a tendency for diagnostic EN I finds to be located closer to the coast than on Zealand. Perhaps this trend has its origin in the pronounced coastal orientation of the EBK in this area, and the coast may have remained fairly important throughout EN I. Nevertheless,

the picture may originate from the long tradition of investigating coastal sites in Jutland, whereas research on Zealand has been directed more towards the interior parts due to peat cutting and the excellent conditions of preservation.

The small residential sites of EN I are clearly without predecessors in the EBK settlement system. However, there is evidence in the EBK of anthropogenic influences on the composition of the forest, and the large amounts of hazel sticks used for fish weirs must be the products of coppice woods (Christensen 1997, 155; Rasmussen 1997, 222; 1998, 77ff.). The pollen diagrams testify to periodic burnings and limited openings in the forest, perhaps established in order to attract game by boosting the undergrowth (Göransson 1994, 168ff.). Several times agriculture and husbandry have been proclaimed in EBK context, yet nowhere is the evidence unambiguous. The finds of cereal pollen in most cases can be interpreted as species of wild grasses (Welinder 1998, 168). Likewise, the complexity of differentiating between aurochs/domestic ox and wild boar/domestic pig has been touched upon earlier (Rowley-Conwy 1985b, 198ff.). Far more convincing are the finds of grain impressions in EBK ceramics at Löddesborg and Vik (Jennbert 1984, 93). However, these do not necessarily imply agriculture in late EBK. First of all, it has been proposed that EBK ceramics in Scania could have been produced during the beginning of the early Neolithic, and the finds really date to Neolithic time (Welinder 1998, 167ff.). On the other hand, it is perhaps more likely that the grain impressions, as suggested by Jennbert herself, ought to be viewed in the context of exchange with continental farmers (Fischer 1983; Jennbert 1984, 157; Klassen 1999). A few domesticated animals and very small amounts of grain may thus have figured within the late EBK as exchange objects of social and symbolic importance, or perhaps even in the context of experimentation on an extremely small scale. According to Jennbert, the settlements of Löddesborg type therefore demonstrate a gradual transition to Neolithic way of life (Jennbert 1984, 153ff.). However, taking into consideration the stratigraphic observations from recent Danish kitchenmidden investigations, the notion of a relatively long transition period can hardly be defended (S. H. Andersen 1991, 22; 1993, 74). Like elsewhere, the Löddesborg sites are considered here to be redeposited and mixed (Koch 1998, 50; Madsen 1987, 235ff.). Obviously the transition happened very fast, resulting in an abrupt drop in ^{13}C-values, a rapid spread of settlement over the entire landscape, and the introduction of a completely new type of settlement.

From what has been outlined above, it is apparent that the transition to agriculture in Southern Scandinavia is an era of change in terms of settlement and land use. However, there are also obvious correspondences between the EBK and EN I, similarities that have been overlooked in the collision of two different research traditions having little intercommunication. In 1960 when J. Troels-Smith gave his vivid picture of the late Mesolithic population, it was characterised as a few small groups always on the move in order to secure a sufficient food supply. The total number of inhabitants in Denmark was thought to approximate 30 individuals at the beginning of the EBK, though growing somewhat through the course of time (Troels-Smith 1960, 102, 113). A completely different situation was perceived in EN I. Based on the excavation of the Barkær structures, Glob envisioned regular villages where around fifty families were living communally in long houses while clearing the surrounding forests for fields and pastures (Glob 1949, 11; 1976, 19). No wonder it had to take an immigration of continental agriculturists in order to convert these primitive hunters to farmers, given the diffusionist theoretical frame of reference that characterised the culture-historical tradition of archaeology in Southern Scandinavia (Becker 1948, 259). However in the 1960's, new theoretical currents became apparent. In the field of social anthropology, works by Sahlins, Service and Lee & DeVore were published, emphasising that certainly not all hunter-gatherers can be considered primitive (see Koch 1998, 34ff for a discussion). This perspective was welcomed by a new generation of archaeologists, and it reached Scandinavia as an integrated part of processualism. Here the discovery of late Mesolithic cemeteries and the evidence of year-round exploitation at the large kitchenmiddens justified a new perception of the EBK. Through analogical reasoning, the EBK is now characterised according to the model of complex hunters (Rowley-Conwy 1983). Instead of small mobile units, large corporate groups living a sedentary life on big year-round base camps are anticipated. This mode of organisation closely resembles that of primitive agriculturists, thus supposedly resulting in a smooth transition to farming (Jennbert 1984, 99ff.; Mahler 1981, 56).

However, while these theoretical reorientations took place in the late Mesolithic field of research, the view on EN I settlement changed. Based on a number of regional surveys, the sites and social units of EN I are now found to be small, just as the overall settlement is dispersed over the landscape (Madsen 1982, 205; Madsen & Jensen 1982, 68; Larsson 1992, 77). Thus, Mesolithic and Neolithic research have drifted past each other, resulting in an inverted situation of incompatibility. Given the model of complex hunters, hardly any similarities are found in the context of EN I. One has to look further into EN II for a centralised organisation of the settlement to reappear in the form of causewayed enclosures and the construction of megalithic graves (Larsson 1995, 95ff.). Hence, the settlement pattern goes from centralised to dispersed and then back to centralised – an evolutionary trend that does not seem to make the transition to agriculture smooth and easy to grasp.

Certainly the idea of complex hunters has benefited late Mesolithic research in Southern Scandinavia by broadening the traditional view on hunter-gatherers. However, whereas some aspects of this general model clearly applies to prehistoric reality, it has commonly been used blindly, thus becoming a straitjacket in understanding the particular cultural context. Throughout this article, an attempt has been made to argue that EBK settlement did not involve large groups living a sedentary life at big year-round coastal sites. Instead large coastal settlements are seen here as products of territorial stability, due to a stable, rich and predictable resource situation (Andersen 1995, 48). Clearly people returned to the same spot at roughly the same time(s) of year throughout centuries in order to perform a specific range of activities. Whereas some segments of the large coastal sites may represent population aggregations, most localities are probably accumulations of smaller settlements separated in time, perhaps extended families that stayed for a few weeks or months. In all probability, it is this particular group that is expressed in the small seasonal sites of Aggersund, Vængesø and Rønbjerg Strandvolde. They are considered here not to be extraction camps exploited by task-groups living permanently at base camps elsewhere. Instead they are viewed as regular settlements, allowing a glimpse of the basic social unit on its seasonal rotation within the territory. Disregarding regional differences in settlement pattern, the general settlement probably consisted of a number of such groups living dispersed within a territory encompassing a small fjord, or even just parts of a fjord, the groups only periodically aggregating when resource concentrations occurred at key localities.

Given this perspective on the late Mesolithic, settlement and land use in EN I becomes significantly easier to comprehend. Here it also seems plausible that a number of small social units were rotating within a confined territory. However, the sites were clearly not relocated on a seasonal basis, and the general settlement was placed further inland and somewhat more dispersed. Hence, the principal organisation of the settlement pattern may largely have been preserved, and the size of the social unit probably remained the same. The idea that the larger coastal catching sites of EN I may have played a role in social integration has been discussed earlier (Madsen & Jensen 1982, 83ff.). If this is in fact the case, the practice may have its origin in periodic aggregations of EBK groups at such localities.

The question of why the settlement was reorganised so rapidly still remains. In this respect, part of the explanation probably lies in an incompatibility of the two patterns of land use. If people in the EBK moved around within a fjord on a seasonal basis, it certainly would be hard to grow grain and keep livestock. Likewise, it was probably not always possible to herd animals and practice agriculture in close proximity to productive fishing grounds.

Another aspect is the agricultural technology. Pollen analysis suggests that slash-and-burn was the prevailing mean of establishing fields, a system of land management not allowing continued exploitation of the exact same locality. This mode of cultivation would inevitably have disrupted the extremely stable pattern of seasonal settlement rotation that characterizes the EBK. Choosing to adopt elements of the Neolithic economy rapidly rendered only one possible solution: husbandry and agriculture were the factors that determined the location of the residential site, whereas hunting, gathering and fishing were activities performed at satellite catching sites corresponding to the old EBK localities. This is not to imply that husbandry and agriculture in the beginning were of greater importance to subsistence than hunting, gathering and fishing. Even a modest practise of Neolithic economy probably would have made the old settlement system collapse, since such activities did not conform to the existing patterns of mobility. However, in course of the settlement being displaced to inland areas, the labour investment of keeping up coastal fishing activities may rapidly have risen to unacceptable heights. This probably led to a more exclusive focus on husbandry, agriculture and other terrestrial resources – a situation indicated by the marked drop in ^{13}C-values.

In all probability, the exploitation of coastal catching sites was mainly reduced to seasonal visits when predictable resource concentrations occurred. As mentioned, such visits may also have been of social importance if the episodes of bulk extraction were performed as a corporate effort of population groups from several settlement areas. Certainly the enormous fish weirs known from the Danish early Neolithic would have yielded much more than a supplement to the local group during for instance the eel run (Pedersen 1997). However, in the long term it may be realistic to suppose that some of the productive coastal catching sites were monopolised by groups living adjacent to the localities, the products thus forming the basis of exchange networks.

Accompanying this overall restructuring of the settlement pattern, the division of labour must have undergone fundamental changes. In terms of husbandry and agriculture, the busiest time of year was probably late summer and autumn when harvesting and collecting of leaf-fodder were essential tasks. This collides with a very productive season in terms of hunting, gathering and fishing, and perhaps this resulted in a scheduling crisis that accelerated the economic substitution process (Zvelebil & Rowley-Conwy 1984, 112). In all probability, new activities could only be introduced in place of existing ones. That is, if an effective reorganisation of the internal, often gender based, division of labour did not compensate,

as is sometimes observed in half agrarian societies (Hastrup & Ovesen 1985, 158ff.). Due to the demands of childcare, women were probably assigned to activities in proximity to the residential site, and it may not be unrealistic to argue that agriculture, husbandry and food gathering were their primary tasks in EN I (Jennbert 1998, 33). On the other hand, a mobile activity like hunting may primarily have been attended to by men (Hastrup & Ovesen 1985, 158ff.). If these patterns are back-tracked into the late Mesolithic, the labour tasks of men may have remained relatively unaltered by the introduction of domesticates. However in the late Mesolithic, fishing and gathering were probably among the more stationary activities, and if these were assigned mainly to women, their role must have changed fundamentally in course of the Mesolithic-Neolithic transition. Summing up these considerations, what largely happened was that husbandry and agriculture substituted fishing. Obviously, this is exaggerated since fishing continued throughout the Neolithic. Judging by the ^{13}C-evidence, however, fishing clearly became marginalized in the early Neolithic and it no longer constituted the dietary stable (Torsten Madsen, lecture at Moesgård).

Concluding remarks

This paper has presented an alternative view on settlement and land use at the Mesolithic-Neolithic transition in Southern Scandinavia. Hopefully it will result in a discussion on the topic, a primary intention of this article. Since the late 1980's the debate on the Mesolithic-Neolithic transition has been one of relatively low activity. As a prescription for this stagnation, it has been proposed that Scandinavian archaeologists should once again adopt a broader geographical perspective. The transition to agriculture in Southern Scandinavia is part of a much larger phenomenon and, consequently, we have to pay more attention to the big picture (Klassen 2000). Surely this is true. However, not everything can be explained in terms of external influences and, as demonstrated here, it may also be important to take a step back and question what we know, or what we think we know, about the local context in which this transition took place. Certainly too much has been taken for granted for too long.

The question of why agriculture was adopted has not yet been addressed in this paper. However, in closing it may be stated that nothing in the settlement patterns suggests an immigration. Continuity obviously overshadows discontinuity and the changes that do occur may easily be accounted for in the local context. Thus, explanations are found in the form of either ecologically determined perspectives (Rowley-Conwy 1984; 1985b; Zvelebil & Rowley-Conwy 1984) or theories emphasising social aspects as the driving force (Jennbert 1984; Price 1995; Stafford 1999). Perhaps none of these models can single-handedly explain what happens in Southern Scandinavia. Apparently the transition to agriculture in this area coincides with a deterioration of the marine ecosystem upon which people were obviously heavily reliant. This is indicated in the molluscan fauna and by the fact that many fjords were cut off by beach-ridge formations due to sea-level fluctuations (S. H. Andersen 1992, 69, 75). Likewise, population growth may be expected during the EBK, since both the number of sites and their size seem to increase (Andersen 1995, 48). Perhaps these factors indicate a resource crisis, yet no indication of a such is seen in either the archaeological or the anthropological records (Meiklejohn et al 1998, 206ff.; Price & Gebauer 1992, 106ff.). The changing resource situation may have rendered some adjustments in the settlement pattern necessary, but seriously doubts are justified that this in itself would have resulted in a collapse.

Meanwhile, however, the archaeological record testifies to a growing interest in new way of life that is gradually moving closer (Fischer 1983; Jennbert 1984, 141ff.; Klassen 1999). The social pull of Neolithic living may have been so strong that the minor alterations needed to adapt the settlement system to the changed resource situation were ignored on behalf of an alternative mode of existence (Koch 1998, 179ff.). Thus, it is defended here that the primary motivation for introducing domesticates in Southern Scandinavia was probably social and part of a much larger ideological phenomenon, whereas the changes in the marine ecosystem may only have triggered something that was already on its way. Many researchers therefore perceive the transition to agriculture as a gradual long-term social transformation (Jennbert 1984, 153ff.; Petersson 2000; Stafford 1999, 136). However, it is argued here that from the point where, for whatever reason, domesticated plants and animals were chosen to be introduced, a primary requirement was the restructuring of settlement and land use that this article has attempted to outline.

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References

Albrethsen, Svend Erik & Erik Brinch Petersen 1976: Excavation of a Mesolithic Cemetery at Vedbæk, Denmark. Acta Archaeologica 47, pp. 1-28.

Andersen, Knud 1983: Stenalderbebyggelsen i den vestsjællandske Åmose. København, Fredningsstyrelsen.

Andersen, Svend Th. 1992: Pollen Spectra from two Early Neolithic Lugged Jars in the Long Barrow at Bjørnsholm, Denmark. Journal of Danish Archaeology 9, 1990, pp. 59-63.

- 1993: Early- and Middle-Neolithic agriculture in Denmark: pollen spectra from soils in burial mounds of the Funnel Beaker Culture. Journal of European Archaeology 1, pp. 153-80.

Andersen, Søren H. 1975a: En Ertebølleboplads ved Vængesø/ Helgenæs. Hikuin 2, pp. 9-48.

- 1975b: Ringkloster. En indlandsboplads med Ertebøllekultur. Kuml 1973-74, pp. 11-94.
- 1976: Norsminde Fjord undersøgelsen. In Henrik Thrane (ed.): Bebyggelsesarkæologi. Beretning fra et symposium d. 7-8 nov. 1975 afholdt af Odense universitet. Skrifter fra Institut for historie og samfundsvidenskab Nr. 17, pp. 18-62.
- 1977: Ertebøllekultur på Vestfyn. En oversigt. Fynske Minder, pp. 7-36.
- 1979: Aggersund, en Ertebølleboplads ved Limfjorden. Kuml 1978, pp. 7-56.
- 1981: Ertebøllekunst. Nye østjyske fund af mønstrede Ertebølleoldsager. Kuml 1980, pp. 7-59.
- 1987: Mesolithic Dug-Outs and Paddles from Tybrind Vig, Denmark. Acta Archaeologica 57, pp. 87-106.
- 1985: Tybrind Vig. A preliminary Report on a Submerged Ertebølle Settlement on the West Coast of Fyn. Journal of Danish Archaeology 4, 1985, pp. 52-69.
- 1990: Limfjordens forhistorie – en oversigt. In Limfjordsprojektet. Rapport nr. 1: Limfjordsegnens kultur- og naturhistorie, pp. 29-65. Århus.
- 1991: Norsminde: A 'Køkkenmødding' with Late Mesolithic and Early Neolithic Occupation. Journal of Danish Archaeology 8, 1989, pp. 13-40.
- 1992: Marin udnyttelse af Limfjorden i stenalderen. In Limfjordsprojektet. Rapport nr. 4: Limfjordsfiskeri i fortid og nutid, pp. 65-96. Århus.
- 1993: Bjørnsholm. A Stratified Køkkenmødding on the Central Limfjord, North Jutland. Journal of Danish Archaeology 10, 1991, pp. 59-96.
- 1994: Norsminde, ein Muschelhaufen mit später Ertebølle- und früher Trichterbecherkultur. Vorläufiger Bericht. In Jürgen Hoika & Jutta Meurers-Balke (eds.): Beitrage zur frühneolithischen Trichterbecherkultur im westlichen Ostseegebiet. 1. Internationales Trichterbechersymposium in Schleswig vom 4. Bis 7. März 1985, pp. 11-49. Neumünster, Wachholz Verlag.
- 1995: Coastal adaptation and marine exploitation in Late Mesolithic Denmark – with special emphasis on the Limfjord region. In Anders Fischer (ed.): Man and sea in the Mesolithic. Coastal settlement above and below present sea level. Proceedings of the International Symposium, Kalundborg, Denmark 1993. Oxbow Monograph 53, pp. 41-66.
- 1997: Ertebølleharpuner og spækhuggertænder. Aspekter af marin fangst i Ertebølletid. Kuml 1995-96, pp. 45-99.
- 1998a: Ringkloster. Ertebølle trappers and wild boar hunters in Eastern Jutland. A survey. Journal of Danish Archaeology 8, 1994-95, pp. 13-59.
- 1998b: En mønstret pragtøkse fra ældre Ertebølletid. Kuml 1997-1998, pp. 9-28.
- 1998c: The Stone Age Coast. Maritime Archaeology Newsletter from Roskilde, Denmark, Nr. 11, December 1998, pp. 11-13.
- 1998d: Erhvervsspecialisering og ressourceudnyttelse i Limfjordsområdet i forhistorisk tid. In Limfjordsprojektet. Rapport nr. 8: Variation og enhed omkring Limfjorden, pp. 97-139. Århus.

Andersen, Søren H. & Claus Malmros 1966: Norslund. En kystboplads fra ældre stenalder. Kuml 1965, pp. 35-114.

Andersen, Søren H. & Erik Johansen 1987: Ertebølle Revisited. Journal of Danish Archaeology 5, 1986, pp. 31-61.

- 1992: An Early Neolithic Grave at Bjørnsholm, North Jutland. Journal of Danish Archaeology 9, 1990, pp. 38-58.

Becker, Carl Johan 1948: Mosefundne Lerkar fra yngre Stenalder. Aarbøger for Nordisk Oldkyndighed og Historie 1947.

Bennike, Pia 1985: Palaeopathology of Danish Skeletons. A Comparative Study of Demography, Disease and Injury. København, Akademisk Forlag.

Bratlund, Bodil 1993: The Bone Remains of Mammals and

Birds from the Bjørnsholm Shell-Mound. Journal of Danish Archaeology 10, 1991, pp. 97-104.

Brock, Vibeke & Bourget Edwin 1991: Analyses of Shell Increment and Microgrowth Band Formation to Establish Seasonality of Mesolithic Shellfish collection. Journal of Danish Archaeology 8, 1989, pp. 7- 12.

Brøndsted, Johannes 1938: Danmarks Oldtid I. 1. udgave, København.

- 1957: Danmarks Oldtid I. 2. udgave, København.

Casselbury, S. E. 1974: Further refinement of the Formulae for determining Population from Floor areas. World Archaeology 6.

Chapman, R. 1981: The emergence of formal disposal areas and the "problem" of megalithic tombs in prehistoric Europe. In R. Chapman, Ian Kinnes & Klavs Randsborg (eds.): The Archaeology of Death, pp. 71-81. London.

Christensen, Kjeld 1997: Træ fra fiskegærder – skovbrug i stenalderen. In Lisbeth Pedersen, Anders Fischer & Bent Aaby (eds.): Storebælt i 10.000 år. Mennesket, havet og skoven. Storebælt publikationerne, pp. 147-156.

Cook, S. F. & R. F. Heizer 1968: Relationships among Houses, Settlement Areas and Population in Aboriginal California. In K. C. Chang (ed.): Settlement Archaeology. Palo Alto.

Ebbesen, Klaus 1982: Yngre stenalders depotfund som bebyggelseshistorisk kildemateriale. In Henrik Thrane (ed.): Om yngre stenalders bebyggelseshistorie. Beretning fra et symposium. Odense 30. april – 1. Maj 1981. Skrifter fra Historisk Institut, Odense Universitet, nr. 30, pp. 60-79.

- 1994: Simple, tidligneolitiske grave. Aarbøger for Nordisk Oldkyndighed og Historie 1992, pp. 47-112.

Enghoff., Inge Bødger 1983: Size distribution of Cod (Gadus Morhua L.) and Whiting (Merlangius Merlangus (L.)) (Pisces Gadidae) from a Mesolithic Settlement at Vedbæk, North Zealand, Denmark. Videnskabelige Meddelelser fra Dansk Naturhistorisk Forening 144, pp. 83-97.

- 1987: Freshwater fishing from a Sea-Coast Settlement – the Ertebølle locus classicus Revisited. Journal of Danish Archaeology 5, 1986, pp. 62-76.
- 1991: Fishing from the Stone Age Settlement Norsminde. Journal of Danish Archaeology 8, 1989, pp. 41-50.
- 1993: Mesolithic Eel-fishing at Bjørnsholm, Denmark, Spiced with Exotic Species. Journal of Danish Archaeology 10, 1991, pp. 105-118.
- 1994: Fishing in Denmark During the Ertebølle Period. International Journal of Osteoarchaeology 4, pp. 65-96.
- 1998: Freshwater fishing at Ringkloster, with a supplement of marine fishes. Journal of Danish Archaeology 12, 1994-95, pp. 99-106.

Eriksen, Lars Buus 1993: Ornehus på Stevns – en tidligneolitisk hustomt. Aarbøger for Nordisk Oldkyndighed og Historie 1991, pp. 7-19.

Fischer, Anders 1983: Handel med skolæstøkser og landbrugets indførelse i Danmark. Aarbøger for Nordisk Oldkyndighed og Historie 1981, pp. 5-16.

- 1985: Den vestsjællandske Åmose som natur- og kulturhistorisk reservat. Antikvariske studier 7, pp. 170-176.
- 1993a: Stenalderbopladser i Smålandsfarvandet. En teori afprøvet ved dykkerbesigtigelse. København, Miljøministeriet, Skov- og Naturstyrelsen.
- 1993b: Mesolitisk indlandsbosættelse. In Steen Hvass & Birger Storgaard (eds.): Da Klinger i Muld... 25 års arkæologi i Danmark, pp. 58-63. Århus, Århus Universitetsforlag.
- 1997: Mennesket og Havet – bosættelse og fiskeri ved jæger-stenalderens kyster. In Lisbeth Pedersen, Anders Fischer & Bent Aaby (eds.): Storebælt i 10.000 år. Mennesket, havet og skoven. Storebælt publikationerne, pp. 63-77.

Glob, Peter V. 1949: Barkær. Danmarks ældste landsby. Nationalmuseets Arbejdsmark 1949, pp. 5-16.

- 1976: Barkær, en landsby med rækkehuse fra tidligneolitisk tid. Iskos 1, pp. 19.

Göransson, Hans 1994: Comments on 'Neolithic Farming Practice – An Archaeological Response to Göransson Hypothesis'. Fornvännen 89, pp. 168-184.

Hansen, Kjeld Møller & Steffen Stummann Hansen 1988: Topperøgel. Arkæologiske Udgravninger i Danmark 1987, pp. 97.

Hastrup, K. & J. Ovesen 1985: Etnografisk Grundbog. København, Gyldendahl.

Hatting, Tove, E. Holm & Knud Rosenlund 1973: En pelsjægerboplads fra stenalderen. Kaskelot 1973 (10), pp. 13-20.

Hernek, Robert 1988: Den spetsnackiga yxan av flinta. Fornvännen 83, pp. 218-223.

Hjelmquist, H. 1975: Getreidearten und andere Nutzplanzen aus der frühneolitischen Zeit von Langeland. In Jørgen Skaarup (ed.): Stengade. Ein langeländischer wohnplatz mit Hausresten aus der früneolitischen Zeit. Meddelelser fra Langelands Museum, pp. 211-219.

Hodder, Ian 1982: Symbols in Action. Etnoarchaeological studies of material culture. Cambridge, Cambridge University Press.

Jennbert, Kristina 1984: Den produktiva gåvan. Tradition och innovation i Sydskandinavien för omkring 5300 år sedan. Acta Archaeologica Lundensia Series in 4°. no. 16.

- 1998: 'From the Inside': A Contribution to the Debate about the Introduction of Agriculture in Southern Scandinavia. In Marek Zvelebil, Lucyna Domanska & Robin Dennell (eds.): Harvesting the Sea, Farming the

Forest. The Emergence of Neolithic Societies in the Baltic Region, pp. 31-35. Sheffield, Sheffield Academic Press.

Jensen, Hanne S. 1982: Skaldyrssæson. Skalk 1982, nr. 3, pp. 9-10.

Jensen, Helle Juel 1994: Flint tools and plant working – hidden traces of stone age technology. Aarhus, Aarhus University Press.

Johansson, Axel Degn 1995: The Ertebølle Culture in South Zealand, Denmark. In Anders Fischer (ed.): Man and sea in the Mesolithic. Coastal settlement above and below present sea level. Proceedings of the International Symposium, Kalundborg, Denmark 1993. Oxbow Monograph 53, pp. 87-94.

- 1999: Ertebøllekulturen i Sydsjælland. Aarbøger for Nordisk Oldkyndighed og Historie 1997, pp. 7-88.

Karsten, Per 1994: Att kasta yxan i sjön. En studie över rituell tradition och förändring utilfrån skånska neolitiska offerfynd. Acta Archaeologica Lundensia. Series in 8°. no. 23.

Kaul, Flemming 1988: Skræppekærgård. Arkæologiske Udgravninger i Danmark 1987, pp. 105-106.

Kempfer-Jørgensen, Lars & David Liversage 1985: Mere om Sejerøs forhistorie. En stenalderboplads, et kulthus og et flintværksted. Fra Holbæk Amt, pp. 7-27.

Klassen, Lutz 1999: Prestigeøkser af sjældne alpine bjergarter. En glemt og overset fundgruppe fra ældre stenalders slutning i Danmark. Kuml 1999, pp. 11-50.

- 2000: The debate on the Mesolithic-Neolithic transition in the western Baltic: a central European perspective. Journal of Danish Archaeology 13, 1996-97, pp. ???.

Koch, Eva 1998: Neolithic Bog Pots from Zealand, Møn, Lolland and Falster. Nordiske Fortidsminder. Serie B. Vol. 16.

Kristensen, Inge Kjær 1988: Tidlig-neolitiske jordgrave i Jylland. En bearbejdning af de jyske tidlig-neolitiske jordgraves morfologi, kronologi og anvendelse. Unpublished thesis from Århus University, January 1988.

- 1991: Storgård IV. An Early Neolithic Long Barrow near Fjelsø, North Jutland. Journal of Danish Archaeology 8, 1989, pp. 72-87.

Larsson, Lars 1984: The Skateholm Project. A Late Mesolithic Settlement and Cemetery Complex at a Southern Swedish Bay. Meddelanden från Lunds universitets historiska museum 1983-1984, pp. 5-38.

- 1989: Ethnicity and traditions in Mesolithic mortuary practices of Southern Scandinavia. In Stephen Shennan (ed.): Archaeological Approaches to Cultural Identity, pp. 210-218. London, Unwin Wyman.
- 1995: Man and sea in Southern Scandinavia during the Late Mesolithic. The role of cemeteries in the view of society. In Anders Fischer (ed.): Man and sea in the Mesolithic. Coastal settlement above and below present sea level. Proceedings of the International Symposium, Kalundborg, Denmark 1993. Oxbow Monograph 53, pp. 95-104.

Larsson, Mats 1984: Tidigneolitikum i Sydvästskåne. Kronologi og bosätningsmönster. Acta Archaeologica Lundensia. Series in 4°. No. 17.

- 1985: The Early Neolithic Funnel-Beaker Culture in Southwest Scania, Sweden. BAR International Series 264.
- 1992: The Early and Middle Neolithic Funnel Beaker Culture in the Ystad Area (Southern Scania). Economic and Social Change, 3100-2300 BC. In Lars Larsson, Johan Callmer & Berta Stjernquist (eds.): The Archaeology of the Cultural Landscape. Acta Archaeologica Lundensia Series in 4°. No. 19, pp. 17-90.

Liversage, David 1981: Neolithic Monuments at Lindebjerg, Northwest Zealand. Acta Archaeologica 51, pp. 85-152.

- 1992: Barkær. Long Barrows and Settlements. Arkæologiske studier. Vol. IX.

Madsen, A. P., Sophus Müller, Carl Neergaard, C. G. Joh. Petersen, E. Rostrup, K. J. V. Steenstrup & Herluf Winge 1900: Affaldsdynger fra Stenalderen i Danmark. København, C. A. Reitzel.

Madsen, Torsten 1979: Earthen Long Barrows and Timber Structures: Aspects of Early Neolithic Mortuary Practice in Denmark. Proceedings of the Prehistoric Society 45, pp. 301-320.

- 1982: Settlements Systems of Early Agricultural Societies in East Jutland, Denmark: A Regional Study of Change. Journal of Anthropological Archaeology 1, pp. 197-239.
- 1987: Where did all the Hunters go? An Assessment of an Epoch-Making Episode in Danish Prehistory. Journal of Danish Archaeology 5, 1986, pp. 229-239.
- 1990: Changing patterns of land use in the TRB culture of South Scandinavia. In Dobrochana Jankowska (ed.): Die Trichterbecherkultur. Neue Forschungen und Hypothesen. Material des Internationalen Symposium Dymaczewo, 20.-24. September 1988, pp. 27-41. Poznan.
- 1991: The social structure of Early Neolithic society in South Scandinavia. In Jan Lichardus (ed.): Die Kupferzeit als historische Epoche; Symposium Saarbrücken und Otzenhausen 6.-13.11.1988. Saarbrücken Beitrage zur Altertumskunde 55, pp. 489-95.
- 1993: Høje med træbyggede grave. In Steen Hvass & Birger Storgaard (eds.): Da Klinger i Muld... 25 års arkæologi i Danmark, pp. 96-99. Århus, Århus Universitetsforlag.
- 1994: Die Gruppenbildung im frühesten Neolitikum Dänemarks und ihre Bedeutung. In Jürgen Hoika & Jutta Meuers-Balke (eds.): Beitrage zur frühneolithischen Trichterbecherkultur im westlichen Ostseegebiet, 1. Internation-

ales Trichterbechersymposium in Schleswig vom 4. Bis 7. März 1985, pp. 227-237. Neumünster, Wacholz Verlag.

Madsen, Torsten & Helle Juel Jensen 1982: Settlement and land use in Early Neolithic Denmark. Analecta Praehistorica Leidensia 15, pp. 64-86.

Madsen, Torsten & Jens E. Petersen 1984: Tidligneolitiske anlæg ved Mosegården: Regionale og kronologiske forskelle i tidligneolitikum. Kuml 1982-83, pp. 78-123.

Mahler, Ditlev Laurentius 1981: Hunter's Storage – Farmer's Birth. Kontaktstencil 19, pp. 51-61.

Mathiassen, Therkel 1938: Gudenåkulturen. En mesolitisk indlandsbebyggelse i Jylland. Aarbøger for Nordisk Oldkyndighed og Historie 1937, pp. 1-186.

- 1943: Stenalderbopladser i Åmosen. København, Nordisk Forlag.

Mathiassen, Therkel, Magnus Degerbøl & Jørgen Troels-Smith 1942: Dyrholmen. En stenalderboplads på Djursland. Det kongelige danske videnskabernes selskab. Arkæologisk-kunsthistoriske Skrifter I, 1. København.

Meiklejohn, Christopher, Erik Brinch Petersen & Verner Alexandersen 1998: The Later Mesolithic Population of Sjælland, Denmark, and the Neolithic Transition. In Marek Zvelebil, Lucyna Domanska & Robin Dennell (eds.): Harvesting the Sea, Farming the Forest. The Emergence of Neolithic Societies in the Baltic Region, pp. 203-212. Sheffield, Sheffield Academic Press.

Midgley, Magdalena S. 1992: TRB CULTURE. The First Farmers of the North European Plain. Edinburgh, Edinburgh University Press.

Møhl, Ulrik 1971: Oversigt over dyreknoglerne fra Ølby Lyng. En østsjællandsk kystboplads med Ertebøllekultur. Aarbøger for Nordisk Oldkyndighed og Historie 1971, pp. 43-77.

- 1975: Die älstesten Haustierspuren in Dänemark. Knochenfunde aus dem frühen Neolithikum auf Langeland. In Jørgen Skaarup (ed.): Stengade. Ein langeländischer wohnplatz mit Hausresten aus der früneolitischen Zeit. Meddelelser fra Langelands Museum, pp. 207-210.
- 1979: Aggersund-bopladsen zoologisk belyst. Svanejagt som årsag til bosættelse? Kuml 1978, pp. 67-76.

Naroll, R. 1962: Floor Area and Settlement Pattern. American Antiquity 27.

Nielsen, Bjarne Henning 1997: De første bønder på Sprogø. In Lisbeth Pedersen, Anders Fischer & Bent Aaby (eds.): Storebælt i 10.000 år. Mennesket, havet og skoven. Storebælt publikationerne, pp. 228-244.

Nielsen, Esben Kannegaard & Erik Brinch Petersen 1993: Grave, mennesker og hunde. In Steen Hvass & Birger Storgaard (eds.): Da Klinger i Muld... 25 års arkæologi i Danmark, pp. 76-81. Århus, Århus Universitetsforlag.

Nielsen, Finn Ole 1997: The Neolithic Settlement on Bornholm. In Danuta Król (ed.): The Built Environment of Coast Areas during the Stone Age. The Baltic Sea-Coast Landscapes Seminar. Session No. 1, pp. 119-126. Gdansk.

Nielsen, Poul Otto 1977: Die Flintbeile der frühen Trichterbecherkultur in Dänemark. Acta Archaeologica 48, pp. 61-138.

- 1981: Bondestenalderen. Sesams Danmarkshistorie bd. II. København, Sesam.
- 1985: De første bønder. Nye fund fra den tidligste Tragtbægerkultur ved Sigersted. Aarbøger for Nordisk Oldkyndighed og Historie 1984, pp. 96-126.
- 1993: Bosættelsen. In Steen Hvass & Birger Storgaard (eds.): Da Klinger i Muld... 25 års arkæologi i Danmark, pp. 92-95. Århus, Århus Universitetsforlag.
- 1994: Sigersted und Havnelev. Zwei Siedlungen der frühen Trichterbecherkultur auf Seeland. In Jürgen Hoika & Jutta Meuers-Balke (eds.): Beitrage zur frühneolithischen Trichterbecherkultur im westlichen Ostseegebiet, 1. Internationales Trichterbechersymposium in Schleswig vom 4. Bis 7. März 1985, pp. 289-324. Neumünster, Wacholz Verlag.

Noe-Nygaard, Nanna 1983: The importance of aquatic resources to Mesolithic man at inland sites in Denmark. In Caroline Grigson & Juliet Clutton-Brook (eds.): Animals and Archaeology: 2. Shell Middens, Fisches and Birds. BAR International Series 183, pp. 125-142.

- 1988: $d^{13}C$-values of dog bones reveal the nature of changes in man's food resources at the Mesolithic-Neolithic transition, Denmark. Chemical Geology 73 (Isotope Geoscience Section), pp. 87-96.
- 1995: Ecological, sedimentary, and geochemical evolution of the late-glacial to postglacial Åmose lacustrine basin, Denmark. Fossils and Strata no. 37, 8th June 1995.

Paludan-Müller, Carsten 1978: High Atlantic Food Gathering in Northwestern Zealand, Ecological Conditions and Spatial Representation. In Kristian Kristiansen & Carsten Paludan-Müller (eds.): New Directions in Scandinavian Archaeology. Studies in Scandinavian Prehistory and Early History 1, pp. 120-157. Copenhagen, The National Museum of Denmark.

Pedersen, Lisbeth 1997: De satte hegn i havet. In Lisbeth Pedersen, Anders Fischer & Bent Aaby (eds.): Storebælt i 10.000 år. Mennesket, havet og skoven. Storebælt publikationerne, pp. 124-143.

Persson, Ove & Evy Persson 1984: Anthropological report on the Mesolithic graves from Skateholm, Southern Sweden. I. Excavation Seasons 1980-1982. University of Lund. Institute of Archaeology. Report Series No. 21.

Persson, Per 1989: Bofasthet under Mesolitikum? Kontaktstencil 30-31, pp. 98-115.

Petersen, Erik Brinch 1971: Ølby Lyng. En østsjællandsk kystboplads med Ertebøllekultur. Aarbøger for Nordisk Oldkyndighed og Historie 1971, pp. 5-42.
- 1973: A Survey of the Late Palaeolithic and Mesolithic of Denmark. In S. K. Kozlowski (ed.): The Mesolithic in Europe. Papers read at the international Archaeological Symposium of the Mesolithic in Europe. Warsaw, May, 7-12, 1973, pp. 77-128. Warsaw, Warsaw University Press.

Petersen, Peter Vagn 1984: Chronological and Regional Variation in the Late Mesolithic of Eastern Denmark. Journal of Danish Archaeology 3, 1984, pp. 7-18.

Petersson, Håkan 2000: Where did all the farmers come from? Journal of Danish Archaeology 13, 1996-97, pp. ???.

Price, T. Douglas 1995: Social Inequality at the Origins of Agriculture. In T. Douglas Price & Gary M. Feinman (eds.): Foundations of Social Inequality, pp. 129-151. New York, Plenum Press.

Price, T. Douglas & Anne Birgitte Gebauer 1992: The Final Frontier: Foragers to Farmers in Southern Scandinavia. In Anne Birgitte Gebauer & T. Douglas Price (eds.): Transitions to Agriculture in Prehistory. Monographs in World Archaeology 4, pp. 97-116.

Rasmussen, Peter 1997: Skov og landbrug på Sprogø i oldtiden. In Lisbeth Pedersen, Anders Fischer & Bent Aaby (eds.): Storebælt i 10.000 år. Mennesket, havet og skoven. Storebælt publikationerne, pp. 219-227.
- 1998: Mid-holocene Vegetation Development at the Inland Ertebølle Settlement of Ringkloster, Eastern Jutland. Journal of Danish Archaeology 12, 1994-95, pp. 65-86.

Renfrew, Colin 1976: Megaliths, territories and population. In Sigfried J. de Laet (ed.): Acculturation and Continuity in Atlantic Europe during the Neolithic Period and Bronze Age, pp. 178-204. IV Atlantic Colloquium. Ghent.

Robinson, David E. 1994: Dyrkede planter fra Danmarks forhistorie. Arkæologiske udgravninger i Danmark 1993, pp. 20-35.

Rowley-Conwy, Peter: 1983: Sedentary hunters: the Ertebølle example. In Geoff Bailey (ed.): Hunter-Gatherer Economy in Prehistory: A European Perspective, pp. 111-126. Cambridge, Cambridge University Press.
- 1984: The Laziness of the Short-Distance Hunter: The Origin of Agriculture in Western Denmark. Journal of Anthropological Archaeology 3, pp. 300-324.
- 1985a: Mellemneolitisk økonomi i Danmark og Sydengland. Knoglefundene fra Fannerup. Kuml 1984, pp. 77-111.
- 1985b: The Origin of Agriculture: A Review of some Theories. Journal of Danish Archaeology 4, 1985, pp.188-195.
- 1998a: Cemetaries, Seasonality and Complexity in the Ertebølle of Southern Scandinavia. In Marek Zvelebil, Lucyna Domanska & Robin Dennell (eds.): Harvesting the Sea, Farming the Forest. The Emergence of Neolithic Societies in the Baltic Region, pp. 193-202. Sheffield, Sheffield Academic Press.
- 1998b: Meat, Furs and Skins: Mesolithic Animal Bones from Ringkloster, a Seasonal Hunting Camp in Jutland. Journal of Danish Archaeology 8, 1994-95, pp. 87-98.

Skaarup, Jørgen 1973: Hesselø – Sølager. Jagdstationen der Südskandinavischen Trichterbecherkultur. Arkæologiske Studier Vol. I.
- 1975: Stengade. Ein langeländischer Wohnplatz mit Hausresten aus der früneolitischen Zeit. Meddelelser fra Langelands Museum.
- 1982: Siedlungs- und Wirtschaftsstrukturen der Trichterbecherkultur in Dänemark. Offa 39, pp. 39-52.
- 1985: Yngre stenalder på øerne syd for Fyn. Meddelelser fra Langelands Museum.

Skousen, Henrik 1998: Rønbjerg Strandvolde – en kystboplads ved Limfjorden. Kuml 1997-1998, pp. 29-73.

Stafford, Michael 1999: From Forager to Farmer in Flint. A Lithic Analysis of the Prehistoric Transition to Agriculture in Southern Scandinavia. Aahus, Aarhus University Press.

Sørensen, Søren A. 1995: Lollikhuse – a Dwelling Site under a Kitchen Midden. Journal of Danish Archaeology 11, 1992-93, pp. 19-29.

Tauber, Henrik 1981: ^{13}C Evidence for Dietary Habits of Prehistoric Man in Denmark. Nature 292, pp. 332-333.
- 1993: Dateringsmetoder. In Steen Hvass & Birger Storgaard (eds.): Da Klinger i Muld... 25 års arkæologi i Danmark, pp. 40-43. Århus, Århus Universitetsforlag.

Thrane, Henrik 1991: Danish Plough-Marks from the Neolithic and Bronze Age. Journal of Danish Archaeology 8, 1989, s. 111-125.

Troels-Smith, Jørgen 1954: Ertebøllekultur – Bondekultur. Aarbøger for Nordisk Oldkyndighed og Historie 1953, pp. 5-62.
- 1957: Muldbjerg-bopladsen. Naturens Verden, Juli 1957, pp. 1-33.
- 1960: Ertebølletidens fangstfolk og bønder. Nationalmuseets Arbejdsmark 1960, pp. 95-119.

Welinder, Stig 1998: Pre-Neolithic Farming in the Scandinavian Peninsula. In Marek Zvelebil, Lucyna Domanska & Robin Dennell (eds.): Harvesting the Sea, Farming the Forest. The Emergence of Neolihic Societies in the Baltic Region, pp. 165-173. Sheffield, Sheffield Academic Press.

Zvelebil, Marek & Peter Rowley-Conwy 1984: Transition to Farming in Northern Europe: A Hunter-Gatherer Perspective. Norwegian Archaeological Review 17, pp. 104-128.

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Reviews

Eva Koch: *Neolithic Bog Pots from Zealand, Møn, Lolland and Falster.* Nordiske Fortidsminder. Serie B. Volume 16. Det Kongelige Nordiske Oldskriftselskab. København, 1998. 575 p., 131 illustrations in the text + 155 plates + 1 distribution map in pocket. 500 DKK + VAT, postage and packing.

This is a book of substance. This solidly bound, comprehensively illustrated and beautifully laid out monograph immediately signals quality and long-term validity and the contents live up to these first impressions.

The book is a reworked and expanded version of a PhD thesis which was defended at the University of Århus in 1996. It takes as its starting point about 700 bog pots found at around 100 localities on Zealand and the adjacent islands. This is a find group which has had a central position in Danish research since C.J. Becker's treatise in "Aarbøger for Nordisk Oldkyndighed" in 1947. The extent and research potential of the find group has increased markedly in the intervening period. Eva Koch has, among other things, been given access to the unique and so far practically unpublished primary source material which was brought to light through J. Troels-Smith and his collaborators' work in Aamosen.

This monograph is a significant contribution to the debate concerning the origin, regional grouping and typological development of the North European Funnel Beaker culture. It gives, furthermore, an authoritative view of the status of the international debate concerning neolithisation in Southern Scandinavia and at the same time delivers essentially new empirical evidence for this classical debate.

In the book the concept of "bog pots" is defined as "clay vessels which, in still useable condition, were placed in wetland areas". The find group originates primarily from the Funnel Beaker culture – mainly from the Early Neolithic and the first half of the Middle Neolithic, i.e. c. 3950-2900 BC (cal.). A small number comes from the preceding (Mesolithic) Ertebølle culture, and some are from the later parts of the Neolithic. The find group appears in Northern Europe across the whole area of the Funnel Beaker culture and is particularly common on Zealand. In Eva Koch's opinion, this concentration of finds is largely due to the effectiveness of Danish Museums and popular support for their work in past decades when intensive peat cutting for fuel took place.

The book begins with a comprehensive historical overview concerning the study of Funnel Beaker pottery and the debate on the neolithisation process in Southern Scandinavia. This chapter is highly recommended for those in search of an updated and multi-facetted introduction to these much-debated topics.

The formal core of the book is the chapter dealing with the definition and dating of vessel types. The typological classification applied is based on measurements of pots, which are so well preserved that one or more entire vertical profiles can be established. Through standardly-scaled drawings of the profiles, all vessels are compared and grouped manually into nine funnel beaker types; types 0-VIII. The grouping is broadly reminiscent of C.J. Becker's type series of 50 years ago. In Eva Koch's classification, however, the subjective elements of the divisions are considerably reduced. A significant new feature is the recognition of a vessel type (type 0) which apparently represents a developmental step between typical Ertebølle and typical Funnel Beaker pottery.

C.J. Becker placed great emphasis on the chronological potential inherent in his pottery classification. It is therefore surprising that Eva Koch rejects the possibility that her grouping can be taken as an expression of a general chronological sequence. On the contrary, types I, II and III are presented as being, in principle, contemporaneous. The reason for this is the considerable series of radiocarbon dates linked to these vessel types. Taken at face value, these dates indicate that all three types are almost contemporaneous and were in use over a period of 3-400 years.

The classification system's principle dependence on the presence of whole vessel profiles results in practice in a limitation of its usefulness. It is not fully operational relative to the large

body of fragmented vessels from settlements. Furthermore, it has to be said that in places there is a need to tighten up definitions relative to the type classification. For example, according to the reviewer's experience it appears that there are vessels which can, according to Eva Koch's system, at the same time be characterised as both Ertebølle vessels and funnel beakers.

A critical evaluation of the central part of the book can similarly not avoid mentioning problems relating to the lack of a critical approach to the many radiocarbon dates which are included. These are partly dates for the contexts in which the vessels were found and partly a significant number of AMS-dates for food crust from the vessels themselves. Through a critical re-evaluation of the radiocarbon dates presented it appears that the wide scatter of the dates for the individual vessel types is, to a great extent, due to well-known and commonplace sources or error. In particular, there are the problems of the internal age of the dated samples (e.g. charcoal from the inner part of large oak trunks) and the presence of secondarily-deposited humus in the samples. In addition to this comes a previously unrecognised problem concerning the dating of food crust from vessels. Eva Koch's data suggests that the food crust dates are often too old. She draws attention to this problem several times with remarks such as "this date is somewhat older than expected" (p. 96), "... 200-500 years earlier than expected" (p. 98) and "... appears to be 2-300 years too early" (p. 101).

A subsequent investigation inspired by reading Eva Koch's book has shown that the surprisingly old dates for food crusts from vessels from inland bogs is probably due to a form of reservoir effect, of which we presumably have been unaware. It arises apparently from freshwater fish cooked in the vessels.

If the problematic radiocarbon dates are removed, a pleasantly surprising situation is revealed – the type series apparently represents a chronological series. For example, it appears that types 0-III represent successive phases each of about 100 years' duration. After several decades of being viewed with considerable scepticism by researchers working on the Early Neolithic in Southern Scandinavia it would appear that typological chronology is in line for rehabilitation.

The lack of a critical approach to the radiocarbon dates used is formally a negative aspect of the book. In the reviewer's opinion the precise and honest presentation of the data and the arguments in practice compensates to a very great extent for this defect. Observations that may contradict the views expressed have clearly not been excluded. Data are presented in such detail and with such stringency that the reader has ample possibilities for further work on the basis of alternative points of view. Accordingly, the book is assured great durability as a source in studies of the Funnel Beaker culture.

The last part of the book comprises a series of chapters in which the bog pots form the starting point for important considerations of Funnel Beaker pottery and the Funnel Beaker culture in general. First there is a section on technological and social aspects of the production of Funnel Beaker pottery. Included in this is personal experience from extensive experimental archaeological research along with ethnographical information of importance for an understanding of the finds gleaned from the literature.

Following this there is a thorough treatment of the original purpose of depositing Neolithic pottery in wetland areas. The conclusion is reached, which will hardly be surprising to the majority, that these are in general sacral depositions which in a series of cases can be shown to have been linked to wooden platforms or stone pavements. To this has been added an important new detail in that the votive offerings are apparently always deposited in open water, albeit often close to land. After inspection of the find sites it is Eva Koch's opinion, furthermore, that she can demonstrate a tendency for them to be placed in the vicinity of prominent areas of high ground. Her conclusion that the sacrificial sites are often found very close to the contemporaneous settlements and relatively close to megalithic graves is rather better documented.

Thanks to Danish archaeology's long tradition of careful mapping of find sites, Eva Koch is able to deliver a comprehensive documentation of the bog offerings' overwhelming proportions and temporal extent. It is apparent that wetland areas with Neolithic bog pots were often also used for sacrifices of domesticated animals and humans as well as flint axes, battle axes etc. In the same bogs flint axes and flint chisels were often sacrificed in later parts of the Neolithic. In many of these bogs sacral depositions also often took place in the Bronze Age and the Pre-Roman Iron Age. With reference to other bogs with votive offerings from later parts of the Iron Age, it is postulated that there has been an unbroken sacrificial tradition, which was maintained from the Early Neolithic and right up to the introduction of Christianity in the area. The author has even gone so far as to claim that the common belief in the 19th century in spirits associated with bogs and rivers has its roots right back in the first offerings of pottery around the time agriculture was introduced. This fascinating point of view must be expected to give occasion for a good deal of debate in the future.

In concordance with the tradition for academic treatises of this kind the book's concluding chapter gives a summary of the typological, economic and social development in the period in question. In this case this means the Early Neolithic and the adjacent parts of the Ertebølle culture and the Middle Neolithic. This is a very useful overview although it does not present any new information of consequence.

The reasons for the change from the Ertebølle culture

to the Funnel Beaker culture are discussed first, then the closely linked introduction of cereal cultivation and animal husbandry. Both external natural influences and the internal social changes in the Ertebølle society are highlighted. The conclusion is reached that it could have been some rather subtle changes in the environment that triggered the change.

Finally, the Funnel Beaker culture's epoch is dealt with in its entirety. The period is divided up into four stages, of which the first is characterised as a short transitional phase between the Ertebølle culture and the Funnel Beaker culture. The next stage comprises, according to Eva Koch's interpretation, two contemporaneous and geographically overlapping groups each with its own material culture and identity: The Oxie group (funnel beakers of type I) and the Svaleklint group (funnel beakers of type II and III). Offerings of the former are more austere than those of the latter. Correspondingly, the former apparently comprises only simple inhumation graves, whereas the latter also has long barrows and wooden chambers. In the subsequent stage (funnel beakers of type IV to VIII) the sacrificial activities in the bogs and at Neolithic graves and causewayed enclosures escalate. In the final stage of the Funnel Beaker culture (Middle Neolithic A III/IV and V) the sacrificing of pottery goes into sharp decline and is replaced by deposition of axes and chisels of flint.

Eva Koch gives a lot of thought to the reasons surrounding the presumed contemporaneous existence of the Oxie and Svaleklint groups. In the opinion of the reviewer, this question, which has long been paid great attention by Scandinavian researchers, is possibly irrelevant, as these groups more probably represent two successive time periods. If this evaluation is accepted then this treatise becomes even more interesting. It delivers the weightiest typological-chronological arguments against the theory that the neolithisation of Northwestern Europe was an expression of a package solution. It appears that the deposition of pottery, Funnel Beaker ceramics and monumental long barrows were introduced successively in Eastern Denmark over a period of several hundred years.

The book's main text is supplemented by data lists and a very comprehensive catalogue with beautiful and informative drawings of a greater part of the pottery dealt with in the book. This is documentation of the highest quality. This book will undoubtedly be used diligently in many research situations for years to come.

In general, it can be concluded that this is both a useful and an inspiring book, which geographically and subject-wise spans far wider than the title suggests. It is recommended both to those who have need of a clear introduction and to those who wish deeper insight in the fundamental source material for studies of the Funnel Beaker culture and the neolithisation of Northwestern Europe.

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Gabriel Cooney: Landscapes of Neolithic Ireland. Routledge/ London 2000. 276pp, 65 figs., 10 plates.

The plural form "landscapes" in the title of Cooneys highly recommendable book on Neolithic Ireland is a well chosen one for two reasons. First, because the physical setting in Ireland differs from region to region as well as within any region due to human impact through time. Second, because human perception of what we normally term the "natural landscape" or "environment" always is rooted in social conventions and thus cannot be treated as an objective dimension of the human experience. *"In this sense all landscapes are social landscapes. ... An implication of this statement is that there never is just one landscape, there are many, different landscapes"* (Cooney 2000, 20). This is exactly what Cooney sets out to demonstrate using archaeological material tied up by well-balanced theoretical and anthropological insight. And he succeeds. In this way his book challenges a widespread traditionalist archaeology rooted in a positivist culture historical vein where landscape is seen as some kind of natural backdrop for human action offering no more, no less than pure resources, places to dwell as well as exerting constraints for human action. However, such a notion of landscape is only two-dimensional. People do not live their lives in space only. They also live in time. And when time and space combine in lived human experience *place* and *history* occurs. And this takes us to the heart of Cooneys argument. Landscapes do not consist of abstract, quantities of matter existing independent in anyone time. Instead, our archaeological investigation must cope with landscapes as social entities with once specific names, meanings, histories, myths and qualities. Just as they are today. In so doing, can we try to gain an understanding of what life was like for the people who lived and created that past, that we as archaeologists and laymen are so intrigued with. However, as Cooney points out, if we are to get as close as possible to the once lived, complex reality we have to complement traditional chronology with notions of individual lifetime. Traditional chronology built on typology has created a fragmented past consisting of arbitrary, consecutive time periods of considerable length void of any human experience on the personal level. However, as Cooney stresses, this way we tend to forget, that past life were actually

lived on a day-to-day basis and the material culture employed once expressed those people's behaviour and ideas (Cooney 2000, 3). One way to approach this realm of past ideas and beliefs is to start by viewing the material traces left as once part of a coherent, meaningful system. This central viewpoint, which runs throughout the book, Cooney acquires from anthropologist Clifford Geertz whose original and most relevant statement may well be reiterated at this occasion: *"Believing, with Max Weber, that man is an animal suspended in webs of significance he himself has spun, I take culture to be those webs, and the analysis of it* may at best be characterised as incomplete. Put shortly, metonymic relations encompass words, actions or objects belonging to the same domain or context where one object may *signify*, or stand for, other objects belonging to the *same* domain or class. *E.g.* a crown is a headdress worn by a king, but at the same time a crown can also be a *sign* for royal power. Metaphoric relations on the other hand, are characterised by combining objects, events or actions belonging to *different* domains or classes on an arbitrary basis. That is, there is no self-evident connection between a given object and the meaning it communicates. Deciphering that meaning, which furthermore may still be ambiguous, depends on the context where these objects appears. Thus, metaphors act as *symbols. E.g.* a certain animal species or a colour may represent social notions such as the snake symbolising evil in Christian iconography or the colour red symbolising danger in the context of modern traffic signs. For a more thorough explanation of these terms, the reader may profit from the works of Leach (1976), Holten (1997) and Tilley (1999) none of which are included in Cooneys bibliography. Nevertheless, Cooney takes on an important and very welcomed task in bringing these notions into the fore of archaeological enquiry. *"By thinking along these lines we may be able to see some of the webs of significance in which people were anchored."* as he rightly stresses (Cooney 2000, 4). And it is exactly through such concepts that Cooneys analysis of landscape proves very valuable. With the background of landscape the physical relations we observe between different pieces of material culture, may not only hint at how past people structured their space and time in daily life, but also how such a structuring was related, reworked and changed through generations. The seemingly fragmented past of archaeological remains can be transformed through interpretation into a more coherent history, or rather the *narratives* of mind. Again Cooneys plural use of the form is deliberate. The fact that we write the past through the present inevitably renders our data theory-laden because as our point of view always will be that of an outside observer's, we work trying to grasp what was going on inside a world different to our own (Cooney 2000, 5f.). Hence, we should approach the past from different perspectives. Cooney suggestion *"... is to tack between our analytical approaches (experience-distant concepts) and the human intentions and practices that produced the past (experience-near lived human reality) in the particular social and historical contexts that we are trying to understand."* (Cooney 2000, 21). In practice Cooney demonstrates this approach by means of two perspectives. First, by shifting between the regional and the local perspective. Second, by shifting between the immediate or particular event and the long time perspective constituted by an accumulation of events. In this way his book may be described as a series of biographies of different landscapes populated by different people who in some ways followed different trajectories and in other ways entered upon the same paths. This approach is certainly the true force of his book. Cooney manages to respect the obvious complexity of material evidence from the Irish Neolithic and at the same time give a qualified and coherent interpretation of *how* these differences and similarities were perceived and *why* they came into being. By constantly keeping these questions in mind Cooney can be said to complement what we might term the *what, where* and *when* questions of the typical positivist, culture historical archaeological tradition. Thereby, he avoids the limits and entrapments of this approach and its tendency to reduce material complexity in order to fit a preconceived box or drawer of classifications disguised as so-called "objective" typologies. So instead of writing of a past solely populated by things, as the latter approach tends do, Cooney ends up with a (pre-)history populated by people *using* things as part of daily life routines but also as part of deliberate and changing social strategies in ritual and power relations. Thus, it is a relief as well as a pleasure to experience an author who dares to include a paragraph entitled *The sunny side of the hill* in the final chapter of the book. In this chapter Cooney indulges us with a fictional account, drawing on available archaeological evidence, of how life may have proceeded through approximately 1,500 years (from 4000-2500 BC) in the Brú na Boínne valley, and more precisely around the well known passage tomb complex Newgrange (Cooney 2000, 213ff.). Such an enterprise sets an admirable example, for showing the relevance of archaeology as the understanding that *people* do matter, instead of focusing solely on *things* that do not really matter *per se.* This, of course, is my personal statement for which I am solely responsible. For those who might disagree with me, Cooneys book also has far more to offer in terms of empirical background descriptions, quantitative diagrams, lithological analysis, distribution maps as well as plans and sections of a variety of archaeological features. After this short discussion of Cooneys conceptual framework and theoretical stance it is to these more empirical aspects of the book that this review shall confine itself.

Cooney progressively develops his ideas on Neolithic landscapes and society throughout 7 chapters. Hopefully,

Cooneys coherent interpretation still will shine through this reviews eclectic presentation, which rather reflects the reviewer's personal observations, theoretical affiliation and Danish perspective than claim to be most relevant for a discussion of the specific trajectories and interpretations of the Irish Neolithic.

Chapter 1 (Cooney 2000, 1-19), *Looking at the Irish Neolithic - a landscape perspective* presents the reader with a review of the general state of research focusing mainly on the different approaches' methodological and theoretical advantages as well as shortcomings. With this as a background Cooney develops his own frame of reference and presents his arguments for applying a landscape perspective as I have outlined above in order to gain a more thorough and holistic understanding of what life was like for the people who lived and created the Irish Neolithic. Also included is a brief chronological frame of reference (Early Neolithic 4000-3600 BC; Middle Neolithic 3600-3100 BC; Late Neolithic 3100-2500 BC) supplemented, among other things, by the main material developments in house and tomb construction within each period.

In chapter 2 (Cooney 2000, 20-51), *Irish Neolithic landscapes*, Cooney discusses how the physical environment in different regions looked and how it may have developed during the Neolithic. Pollen analyses, macrofossils and Carbon 14 dates combined with archaeological features such as *e.g.* field walls and burial mounds are intended to produce a landscape collage. Although forest and woodland dominated it was interspersed with farmed land thus showing different degrees of land organisation. This varied from large, organised field systems up to 1000 ha, regulated by low stone dykes as exhibited by the *Céide Fields*, Co. Mayo (3700-3200 BC), to the smaller farmed clearances or other areas which may be used either on a short term or repetitive, seasonal basis. This *Western Neolithic* landscape is traditionally seen as representing a somehow different economic and worldview which later developed into the ritual landscapes of the *Passage Tomb Tradition* in the east of Ireland as exemplified in the Brú na Boínne area. In this region huge passage tomb complexes were constructed in the later part of the Neolithic (3350-2900 BC) at Newgrange, Knowth and Dowth. However, Cooney speculates whether this difference in landscape organisation is a prehistoric reality or a modern construct. Perhaps it is rather a reflection of our present's focus on the monumental, whereby we tend to ignore other, though smaller, but perhaps functionally similar ceremonial centres in areas in between as e.g. *Loughcrew*, Co. Meath and *Carrowkeel* and *Carrowmore*, Co. Sligo (Cooney 2000, 33). Likewise, Cooney questions the common distinction in "ritual landscapes" as sacred and thus separate from secular landscapes: *More usefully we should think of the sacred and secular not as separate but rather as interwoven aspects of life* (Cooney 2000, 21). Following this line of thought he suggests that *e.g.* the introduction of cereals in the EN would not only fulfil nutritional needs but also carry important religious and symbolic connotations. Cereals may at the same time have acted as a metonym marking the altered relations between man and land as documented by the decline in tree pollen. This might explain why cereals often are found in ceremonial contexts throughout Britain as well as in southern Scandinavia (Cooney 2000, 39). However, parallels in such contextual circumstances indicating some similarity in symbolism throughout wide geographical areas are not to be confused with direct similarity in lifestyles and processes of neolithisation. The occurrence of organised field systems, as Ceidé Fields right from the EN of Ireland have as yet no counterparts in England, and where instead organised fields is a Bronze Age phenomenon. Thus, Cooney concludes (Cooney 2000, 36ff.) *"...it should not be surprising if there was considerable diversity of lifestyles and landscapes across Ireland and Britain during the fourth and third millennia BC as people made local accommodations between their social world and the rhythms of the land."*

Chapter 3 (Cooney 2000, 52-85), *Home is where the hearth is*, focuses on the domestic dimension of landscapes understood as a *system of settings* comprising houses, their immediate surroundings as well as their settings in the landscape (Cooney 2000, 56). From a similar holistic point of view Cooney tackles the common archaeological distinction between "ritual" and "domestic" architecture (Cooney 2000, 57). Certainly from a Danish perspective this is a welcome and most needed statement where the problematic distinction is widespread. This preconceived split fails to recognise that "ritual" is not an "object" *per se*, but a *quality*, which, according to context and use, may be attributed to even the most mundane of things. Another point of general interest presented by Cooney is how traditional archaeological documentation of Neolithic houses in the form of two-dimensional ground plans often leads to a similar two-dimensional *perception* of houses in archaeological interpretation. It may well be that conditions of preservation provide us only with two-dimensional representations of houses but this does not automatically infer that we only can ask ground-level questions regarding typology, house size and activity areas. So Cooney is correct to stress that houses originally were created as 3-dimenisonal spaces and thus structured human movement and experience (Cooney 2000, 56). From these considerations it follows, that our interpretation of them should try to incorporate a similar 3-dimensional perception focusing on bodily movement and vision and look at how these experiences were orchestrated by the placing of doors, internal screens, fireplaces or other barriers and thus creating zones of inclusion and seclusion, lightness and darkness, etc (Cooney 2000, 56). All such architectural dimensions were exactly

part and parcel of the daily *experience-near lived human reality* and may thus help us *experience-distant viewers* to catch a faint glimpse of the distant daily lives we excavate. In doing so, we can reflect how architecture is on the one hand a product of original human ideas but, once created, come to have an objective existence of its own. Seen in this way architecture is not only a neutral product sprung from human ingenuity to fulfil functional needs. Architecture also shapes the experience of future generations in favour of certain worldviews or ideologies by means of constantly recurring designs and use-patterns. As with landscapes, the lesson being taught is that houses are much more than just containers for human action. Rather they are *mediums* used in social discourse. Put shortly architecture "constrains" as much as "contains". Unfortunately, the archaeological house material in Ireland is for now very sparse though increasing. Thus Cooneys interpretations of house architecture seem naturally generalised offering no more than the rather sterile conclusion that all elements had significance one way or the other (e.g. Cooney 2000, 64). Much more important is his analysis of the general developments of architecture and settlement in two separate regions; *Knockadoon,* Lough Gur in Southern Ireland and *Knowth,* Brú na Boínne in the northwest. The two sites both display repeated use throughout the Neolithic and thus are perfectly suited to show the importance of *history* and *place* (cf. above). Even though both localities show similarities in their EN beginnings they end up very different by the end of the Neolithic. Knockadoon still a place of local importance only, while Knowth becomes of regional significance. Thus, Cooney concludes: *"What we have to get away from is the perception that island-wide contacts and use of similar styles of artefacts can be read as implying island-wide cultural uniformity."* (Cooney 2000, 84f.).

Chapter 4 (Cooney 2000, 86-126), *The Dead Are Everywhere,* probes further into the complex issue of interpreting links and differences in material culture. The focus is on megalithic tombs normally classified in four main types; court tombs, portal tombs, passage tombs and wedge tombs. Furthermore, these types are traditionally seen as representing different cultural groupings (Cooney 2000, 92f.). While the later wedge tombs are of early Bronze Age date the other types have now been shown to overlap in time as well as in space during the Neolithic. Furthermore, the court, portal and passage tombs are linked by morphological similarities, accessibility, the occurrence of identical artefacts as well as the phenomenon of repeated burials. These tomb types are in one area, *Munster* and *Leinster,* supplemented by a contemporary but otherwise very different tomb type known as *Linkardstown burials.* They consist of small stone cists that hold either one individual or the remains of a few people deposited on one specific occasion. A cairn and a mound to make it inaccessible and complete then cover the burial. Thus, Cooney stresses, *"More important than any concept of a generalised diachronic sequence was the extent of contemporary variation. There were recognised ways of treating the remains of the dead but the way these customs were put into practice to integrate the living, the dead and the ancestors were very different at a regional and a local level and may have supported different social strategies."* (Cooney 2000, 121). However, as he shows, social strategies could also turn very dissimilar burial features into quite similar monuments through time. This is brilliantly illustrated by the example of two contemporary megalithic tombs *Fourknocks I* and *Fourknocks II,* Co. Meath (Cooney 2000, 105ff.). Though a distance of some 50 m only separates them at time of their initial construction they remain "a world apart" due to their marked differences in architecture. *Fourknocks I* was laid down as a classic passage tomb, while *Fourknocks II* originally consisted of a circular ditch around a small cairn and an oblong cremation pit. However, through generations, repeated use and architectural transformation the outer structure of *Fourknocks II* was made to *look like* a passage tomb. What started out as two different stories - or narratives - finished with similar endings. Eventually, as a postscript, both monuments ended up as Bronze Age cemeteries. Cooney points out, that such a recurrent use of specific locations and monuments through long spans of time is unlikely to have been the product of unrelated later activities. Instead, such patterns displayed through reuse demonstrate how landscape and monuments served as important memory prompts where knowledge could be passed on from generation to generation in societies relying on oral and visual narrative traditions (Cooney 2000, 90f., 112).

In chapter 5 (Cooney 2000, 127-173), *Monumental Landscapes,* Cooney follows this line of thought in order to explain how monuments changed and humanised Neolithic landscapes. One important characteristic of monuments is, that once erected their presence and permanence not only alter the physical landscape but also alter the later generations mental perception of it (Cooney 2000, 127f.). It is likely that the points in the landscape where monuments were erected in the first place may already have been experienced as special. Ample ethnographic evidence shows, that many societies see landscapes as living entities, where special topographic features mark *liminal* places suited for contact to the spirit world (se also Cooney 2000, 89). Thus, a monument may serve to identify a place, which was already regarded as special. This can explain why some megalithic tombs either "grow" out of natural rock formations or are directed towards distinctive topographic features (Cooney 2000, 130). Likewise, incorporation of earlier standing stones into later megalithic monuments may also have served to transfer spiritual powers into the new monuments (Cooney 2000, 134f.). Using a similar phenomenological approach Cooney compares the topographic affinities of the

traditional megalithic tomb types in two regions, *Cooley* and *Mourne Mountains* in Northeast Ireland and the northern part of the *Dublin/Wicklow Mountains* further south: *"Instead of the traditional chronological approach, perhaps a more realistic way of looking at this evidence is to think of different tomb types being deemed appropriate for different locations. We could think of this as a sacred landscape with a number of focal points, some being relevant for particular communities while others seem to have served as a wider, visible regional focus."* (Cooney 2000, 142). Cooney demonstrates how the architectural "closed" passage tombs are situated on high, visible grounds while the more "open" portal and court tombs are situated in lower, more accessible terrain (Fig. 5.4, 5.6). Cooney therefore suggests that the passage tombs represented more widespread ancestral allegiances, which should be visible from far and away while portal and court tombs served more local, ancestral lineages. Cooneys attempts to unravel the general relationships between topography and monument types in terms of social and religious strategies are persuasive and deserve general interest from anyone who engages in landscape studies. His analysis of the development of passage tomb complexes such as Newgrange is however far less convincing (Cooney 2000, 152ff.). The chronological relations between the smaller passage tombs and the more substantial ones is far from clear-cut in the archaeological evidence and using a simple "evolutionary" model where mounds less than 15 m in diameter precedes mounds between 15-36 m in diameter again to be followed by mounds up to 85-90 m in diameter is questionable. Much more interesting, and resting on firmer empirical ground, is Cooneys understanding of the relationship between the large passage tombs and their orientation towards important celestial phenomenons: *"It seems very likely ... that this indicates a concern with control over the knowledge and ordering of time, which was linked to the ancestral world by being "captured" in the tomb structure. Now this time was fixed by the monuments, rather than the monuments being built at the right time. By merging the concepts of ancestral, celestial and temporal power, authority in society could be deemed to have a quasi-divine basis."* (Cooney 2000, 157). Again, such an explanation pays due consideration to the nature and function of rituals and it demonstrates how ritual knowledge also can be used in power relations between different social groupings and thus can be reworked and transformed through time: *After all one of the values of ritual is that it is open to different, sometimes apparently contradictory, meanings."* (Cooney 2000, 173).

Chapter 6 (Cooney 2000, 174-211), *Living in a Material World*, lends further anthropological insight to the complex ways people interact with material culture - as producers of objects, and also through the ways people themselves become "produced" and "reproduced" through object use and identification: *"Much of the significance of objects lies in the way that, through metaphor and mentonym, they can be seen to stand for or symbolise many different kinds of social realities and relationships."* (Cooney 2000, 174). What Cooney emphasises is that artefacts - like landscapes and monuments - possess *biographies.* Object biographies are composed of production, use and eventually discard history, but at the same time it is important to remember that *"objects have "lives" only because they are endowed with meaning by the people who make and use them."* (Cooney 2000, 175). One way to try to approach such meanings in prehistoric societies is through contextual analysis of the find circumstances. Using axes as one example Cooney carries out a persuasive interpretative analysis of this tool, which reveals it as an object where practical function merges with symbolic notions. While Mesolithic axes primarily were made on easy workable stone materials, their Neolithic successors encompass a greater material variety demanding more complex manufacturing as well as complex organisation in production. This development, Cooney suggest, signifies the greater social role of the axe in Neolithic societies (Cooney 2000, 202). This conjecture is further accentuated through the appearance of the axe object in all sorts of contexts: causewayed enclosures, blockings of megalithic tombs, hoards, as well as in items of long distance trade (Cooney 2000, 189, 209). The latter use is especial concerned with axes which posses certain "valued" qualities and may be more visually distinct in terms of length, colour and materials even though these very same features often render them the poorer as functional items (Cooney 2000, 199). Examining production sites, Cooney objects to the traditional functionalistic perspective on quarrying: *"If we see the landscape as a living entity ... Extracting stone from the earth can be seen then, as providing a contact with the spirit or ancestral world. This both imbued the stone with power but for the same reason it would have been seen as a dangerous activity for the people involved."* (Cooney 2000, 190). Such an understanding of landscape and its exploitation, supported by examples from ethnography and Irish folklore, also explains why Neolithic people often chose to exploit the most inaccessible rock sources while leaving more easily approachable, but otherwise identical, sources unused. Thus, Cooney argues that certain topographical features were endowed with powerful liminal qualities, which furthermore may have been thought of as enhancing the "physical" qualities of the resulting stone axes (Cooney 2000, 192).

In the final chapter 7 (Cooney 2000, 212-232), *Local Places, Big Issues*, Cooney stresses that the regional never can be properly understood without thorough examination of the local on its own terms. Again, this is a most relevant warning against the frequent assumption among archaeologists that similarity in one material aspect of life, as in *e.g.* monument building, automatically infers similarity in all other aspects of life, be it beliefs, social organisation, etc. (Cooney 2000, 220). Even

though material culture evidence often displays similarities, such a reductionist view of culture tends to ignore, that the same evidence also shows apparent differences. Cooney convincingly demonstrates this by means of three maps of Ireland subdivided after three phenomenons: biogeographical regions, monument types and axe types (Fig. 7.2, Cooney 2000, 222). None of the resulting regions show congruence and all combine in different ways depending on the actual area. Thus, such obvious complexities justify Cooneys call for an interpretative, contextual analysis which pays due attention to the uniqueness of each individual setting and its history of place. Another warning of general interest presented by Cooney is the tendency to evaluate the advent of the Neolithic from a core/periphery perspective where the land of Ireland - one might also be tempted to add Scandinavia - is viewed as peripheral to a greater landmass. However such a "Eurocentric" view, as one may term it, is historical determined and differs markedly from the perspective of the people in the Irish Neolithic. Thus, Cooney argues for a different perspective in accordance with these ancient peoples near lived experience and demonstrates this in a most original and brilliant way by redrawing our traditional European map with Ireland as its centre (Fig. 7.5). So doing, Cooney at the same time disputes the tendency to treat the Neolithisation of Europe as an event and instead view it from a local level as a *process*, whether or not newcomers or indigenous communities were involved (Cooney 2000, 230). Thus, drawing to conclusion Cooney states that *"...we need to look at places and landscapes in a historical context. People make their histories and create places in the context of the local conditions of life and society which both enable and constrain the conduct of life"* (Cooney 2000, 232).

Likewise, drawing to a conclusion the present reviewer may well express the hope that Cooneys original and well-written book may gain much more than local importance. Not only will it be of interest for scholars working on Neolithic societies in specific but Cooneys work will also be of general interest for anyone engaged in archaeological discourse as a most valuable methodological exercise in the intriguing and complex relationships between man, memory, material culture and milieu.

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References

Geertz, C., 1973: *The Interpretation of Cultures.* New York, Basic Books.

Leach, E. R., 1976: *Culture and Communication. The logic by which symbols are connected. An introduction to the use of structural analysis in social anthropology.* New Studies in Anthropology. Cambridge, Cambridge University Press.

Holten, L., 1997: Interpretation of Material Culture. *Acta Archaeolgica* vol. 68, 1997, pp. 183-188. København.

Tilley, C., 1999: *Metaphor and Material Culture.* London, Blackwell Publishers.

Malcolm Todd: Die Germanen. Von den frühen Stammesverbänden zu den Erben des Weströmischen Reiches. Stuttgart: Theiss Verlag, 2000. ISBN 3 8062 1357 7. 270 pages, 41 black-and-white figures/plates. DM 59.00.

Works taking an overview of developments within a given period over large regions or continents are often very useful and should therefore always be welcomed. This is also the case for the English archaeologist Malcolm Todd's synthesis of the history of the Germans in the period from the 4th/3rd century BC to the 7th/8th century AD, which is now available in a German EDITION.

This very stringently organised account falls into two main sections. The first of these (pp. 9-131) uses a wide range of archaeological and historical sources to address a series of subjects which together give an overview of the history of the Germans and their significance for the development of Europe in the period in question. The second section (pp. 135-240) deals with the history of the Germanic tribes. The book concludes with a summary of research history, a list of written sources, a reference list and a very useful and comprehensive glossary.

The book, which was originally published in England in 1992 under the title *The Early Germans,* has, according to the colophon, been updated by the author in connection with the publication of this German edition. Despite this, account has not been taken of some of the more recent literature. Similarly, several important archaeological finds from the last decade are not mentioned. This could, of course, be a conscious choice on the part of the author. Mention of the epochal identification of the site of the slaughter of Varus' legions in 9 AD would, however, have been of relevance (cf. for example Schlüter (ed.) 1993; Schlüter & Wiegels (eds.) 1999).

A general feature of the book is that it is built up around written sources. This has resulted in many very readable and informative accounts. In the description of the structure of Germanic society (p. 33ff.) this method has, however, its shortcomings. Decades of study, and the very precise chronological insight which this gives, makes it possible, on the basis of the archaeological record, to describe the development from the small autonomous power configurations of the Pre-Roman and the Early Roman Iron Age to the centralised supra-regional power centres of the Late Roman Iron Age and the subsequent development of royal power (cf. for example Hedeager 1992; Jørgensen 1995). This is not, however, expressly stated in the book, in which the terms *rex*, *duces* and *comitatus* are discussed solely on the basis of the written sources, without involving the stratification which is apparent from analyses of the war booty deposits from Ejsbøl and, not least, Illerup (von Carnap-Bornheim & Ilkjær 1996, 483ff.), the grave finds (e.g. Lund Hansen 1998a) and discussions regarding the use of gold rings as aristocratic insignia (cf. Lund Hansen 1998b).

In the section on Germanic settlements (p. 61ff.), the author does, however, make use of the archaeological source material. This has resulted in a good overview with respect to the Netherlands, Northwestern Germany and Denmark. The source material relating to settlement in Barbaricum varies considerably, for various reasons, from area to area and a collective description is therefore impossible. Knowledge of settlements of the Wielbark culture is, for example, only very sporadic (cf. Martens 1989), whereas Southern and Western Norwegian farm units from the Roman Iron Age and the Migration period are well documented. Together with grave finds and hoards the latter provide a picture of a well-developed power structure (Myhre 1987; 1997), which is, to a great extent, relevant in an evaluation of the military-aristocratic society in Barbaricum and could therefore very appropriately have been discussed in this book. The Sîntana de Murés-Cernjachov culture's settlements north of the Black Sea are also well-known. These could also have been discussed in the light of their great variation, which extends from buildings with stone foundations in the coastal areas, to pit-houses and post-built long-houses of North European type (cf. for example Häusler 1979).

In the section on relations between Germans and Romans (p. 79ff.), a useful overview of the written sources regarding this theme is given in the introduction. As a supplement to this, mention should perhaps have been made of the production of Roman pottery in Haarhausen, Thüringen (Dušek 1992), as this find gives reason for a significant gradation of the terms "Roman" and "Germanic".

Roman-Germanic relations are nowhere more clearly expressed than in the wealth and power centre concentrated around the aristocratic burial site of Himlingeøje in Eastern Zealand of which oblique mention is made on p. 84: „In der westlichen Ostseeregion stoßen wir auf so viele Importe aus dem Römischen Reich, daß wir ernsthaft von einem größeren Verteilungszentrum, vermutlich auf einer der dänischen Inseln ausgehen müssen, von dem aus die Waren in andere Gebiete Südskandinaviens weitergeleitet wurden". Himlingeøje represents the most thoroughly analysed and published power structure of any from the Late Roman Iron Age in Barbaricum (cf. Lund Hansen *et al.* 1995) and it functioned as a catalyst for the fundamental changes in society which took place around the fighting of the Marcomannic Wars. Eastern Zealand was therefore more than just a "distribution centre" for Roman imports, as the distribution of imports is, along with the various types of jewellery, today the visible evidence of a power centre which was the hub of an aristocratic network extending from the Sîntana de Murés-Cernjachov culture north of the Black Sea to Central Sweden and Southern Norway. The oldest graves at Himlingeøje date from the second half of the 2nd century AD and are, accordingly, contemporary with the fighting of the Marcomannic Wars. The participation of the Zealandic aristocracy in these wars appears to have been a contributory factor behind the development of the power centre on Eastern Zealand. The problem is just that the equipment in the graves sends conflicting signals with regard to which side they supported; was it the Germans or the Romans.: The kolben arm ring in grave 1894 from Himlingeøje suggests the former, whereas the two silver beakers (mentioned on p. 121) found in grave 1829, and decorated with warriors armed with Roman ring swords, could indicate the latter. Features from the citadels of Saalburg and Zugmantel, dated to the time prior to the abandonment of *Agri decumates*, have produced a relatively large number of bi-sectioned crossbow fibulae with a high pin catch of Almgren's group VII (Beckman 1995). The distribution of fibulae of this type shows concentrations on Zealand and Funen, and the finds from Southwestern Germany could suggest Southern Scandinavian involvement in the Roman border defences. Whether this was also the case as early as the 2nd century AD, and whether the consolidation of the Eastern Zealandic centre is, to a certain extent, a consequence of this, are so far still open questions.

In the discussions relating to trade and market places, the trade and craft centre at Gudme, Southeastern Funen can naturally not be ignored. With its associated workshops and landing place at Lundeborg it played an important economic role from the 3rd century AD onwards (p. 91f.). The author mentions several contemporaneous and later parallels to the complex on Funen, but omits unfortunately to mention the very interesting, and relevant, settlement at Jakuszowice in Southern Poland (God_owski 1995), which in many ways is reminiscent of, and contemporary with, Gudme/Lundeborg.

Gudme/Lundeborg and, not least, Himlingeøje with its very direct relations to the Roman Rhine provinces on the one hand and a very broad contact surface to the rest of Barbaricum on the other, could have been used to present a description of Barbaricum as a dynamic entity, with a hinterland which in no way was marginalised relative to the Continent and which was characterised by extensive, supra-regional alliances both between Germanic peoples and Romans and between the Germanic aristocracy in areas lying distant from one another. This applies not only to the Late Roman Iron Age but to just as great an extent in subsequent times, as illustrated, for example, by the distribution of the different variants and media of the artistic styles.

In the section on religion, art and crafts (p. 97ff.) a series of spectacular archaeological sources are touched upon; the bog bodies and the two gold horns from Gallehus in Southern Jutland very naturally occupy a prominent position. With regard to the gold horns, the author quite correctly draws attention to the fact that their symbolic content has not yet been fully deciphered and probably never will be. The fact that several elements of the decoration seen on the horns can also be found on pottery from the Süderbrarup cemetery (Bantelmann 1988) is hardly insignificant relative to a more detailed understanding of the horns' symbolism. Another well-known find from Denmark which is found worthy of mention, although not in the section of the religion of the Germanic peoples, but on p. 25f., is the silver cauldron from Gundestrup in Himmerland. As the author remarks, the provenance of this cauldron has, as a consequence of the mixture of both Celtic and Thracian elements, been vigorously discussed and has actually formed the basis for the formation of different schools. This discussion has, however, now been terminated with the appearance of F. Kaul's thorough and well-argued studies which have localised the cauldron's origin to the Thracian Triballoi in Northwestern Bulgaria and Southwestern Romania (Kaul 1991a; 1991b).

A special aspect of Germanic religion, also mentioned by Roman authors, is shown by the North European war booty deposits (p. 100ff.). These give a unique insight into the military potential of the aristocracy and into the battles which raged between different North European power constellations in the Roman Iron Age and Early Migration period. The earliest war booty deposit, from Hjortspring on Als, still stands alone in the Pre-Roman Iron Age (dated to the 4th century BC – not as given in the book (p. 101) 100 BC; cf. Randsborg (1995, 20)), while the other votive finds bear witness to the fact that Northern Europe was a veritable battleground in the period from the 3rd to the 5th centuries AD. Both German and Danish scholars are involved in intense research into this group of finds. Their research includes renewed analyses of old finds and new excavations at already known sites (cf. for example von Carnap-Bornheim 1997; Bemmann & Bemmann 1998; Rieck *et al.* 1999) through which our knowledge of the ruling military-aristocratic social hierarchy is continually being expanded. Despite this, it is hardly correct when the Torsbjerg find is said (p. 101) to be one of the best investigated votive finds of this type, as the author, accordingly, overlooks J. Ilkjær and C. von Carnap-Bornheim's treatment of the systematically excavated votive find from Illerup Ådal (Jutland Archaeological Society publications XXV:1ff., Århus 1990ff.). A good example of what modern analysis of a well-known find can produce is, incidentally, C. von Carnap-Bornheim's investigation of the decoration on two *phalerae* from the Torsbjerg find (von Carnap-Bornheim 1997). These can now be shown to have been made by the same craftsman, whereas it was previously thought, as cited in the book (p. 117), that a Germanic craftsman had added to the original Roman ornamentation.

In the section on Germanic art, the appearance of the polychrome style and the use of metal foil are both quite justifiably given a prominent position (p. 115ff.) as these are phenomena which clearly cast light on innovation and mobility. Significant new knowledge has also been acquired within these areas in recent years (von Carnap-Bornheim 1994; 1999a), in that serious doubt has been expressed regarding Gothic influence on the development of polychrome jewellery art. With respect to the spectacular East European finds of polychrome art, R. Harhoius' very praiseworthy and richly-illustrated work on the Early Migration period in Romania (Harhoius 1997) should not be forgotten.

In his excellent account of artistic styles in the Migration period (p. 125ff.), the author could, in addition to the animal styles, also have included the Sösdala style. This punch-based style, which has a wide distribution extending from Scandinavia along a belt running down over Eastern and Central Europe, provides very important evidence concerning the maintenance of a supra-regional aristocratic network subsequent to the Hunnish raids. The style is also represented in the hoard from _imleul Silvaniei, Romania (not Hungary as stated on p. 129) (Capelle 1994), which has close relations to the hoard from Brangstrup in Central Funen.

In the opinion of the reviewer, the second half of the book, with the main heading of "Das germanische Europa" stands much stronger than the first. The author gives an extremely readable summary of the history of a series of Germanic tribes based primarily on written sources. The history of the Goths is of great interest, not least for North European archaeologists. It is therefore very pleasing that this receives so much attention in the book (p. 138ff.). Even through serious doubt is cast on the value of Cassiodorus' and Jordanes' history of the Goths (Søby Christensen 1999) there are indisputable bonds between Scandinavian and both the Wielbark and

the Sîntana de Mure_/_ernjachov cultures (cf. for example Bierbrauer 1994; Heather 1996).

Also of significance in a North European context are, of course, the Franks, who had a great influence on the development of new political structures in Scandinavia in the Late Iron Age (Jørgensen & Nørgård Jørgensen 1997, 111ff.; Nørgård Jørgensen 1999, 156ff.). Once again this underlines how important it is not to underestimate the great degree of mobility which characterised the history of Europe in the 1st century AD. Incidentally, a couple of corrections should be made to the section on the Franks. On p. 184 it is stated that the well-known female grave from St. Denis in Paris represents Queen Arnegunde; this is hardly in agreement with recent research (cf. Roth 1986, 140ff.). On p. 182 it is stated that Childerich was buried with a gold neck ring. This is in fact a kolben arm ring, i.e. the same aristocratic insignia which was introduced to Barbaricum with Himlingeøje grave 1894 (most recently von Carnap-Bornheim 1999b, 57ff.).

In summary, it must be concluded that Malcolm Todd has, despite the comments raised here, written a fairly good introduction to a very complicated subject. The book's strength lies decidedly in the many compilations of written sources. The book's weakness, on the other hand, is clearly the relatively few references, which makes it less useful for the interested layman or younger student, who requires a basis for further immersion. To these people I would, therefore, rather recommend some of the professionally innovative works which have seen the light of day in recent decades; for example books by B. Cunliffe (1988), P. Geary (1988; 1996), K. Randsborg (1991; 1995), L. Hedeager (1992), J. Collis (1997) and P. Wells (1999). There is, furthermore, a series of marvellous and well-illustrated German language exhibition catalogues in which stringent professional knowledge, accompanied by comprehensive references, is made available to a broader audience, for example *Gallien in der Spätantike* (1980), *Germanen, Hunnen und Awaren* (1987), *Schätze der Ostgoten* (1995), *Die Franken: Wegbereiter Europas* (1996), *Die Alamannen* (1997), *Barbarenschmuch und Römergold: Der Schatz von Szilágysomlyó* (1999) and *Römer zwischen Alpen und Nordmeer* (2000).

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References

Bantelmann, N. 1988. *Süderbrarup. Ein Gräberfeld der römischen Kaiserzeit und Völkerwanderungszeit in Angeln. I. Archäologische Untersuchungen.* Offa-Bücher 88. Neumünster, Wachholtz.

Beckmann, B. 1995. Die germanische Funde in den Kastellen des Taunuslimes und ihre Beziehungen zum Fundgut in der Germania libera. In U. Lund Hansen *et al.* 1995, pp. 410-413.

Bemmann, G. & J. Bemmann 1998. *Der Opferplatz von Nydam. Die Funde aus den älteren Grabungen: Nydam-I und Nydam-II.* Neumünster, Wachholtz Verlag.

Bierbrauer, V. 1994. Archäologie und Geschichte der Goten vom 1.-7. jahrhundert. Versuch einer Bilanz. *Frühmittelalterliche Studien* 28, pp. 51-171.

Capelle, T. 1994. *Die Miniaturenkette von Szilágysomlyó (_imleul Silvaniei).* Universitätsforschungen zur Prähistorischen Archäologie 22. Bonn, Habelt.

von Carnap-Bornheim, C. 1994. Zur Entwicklung des germanischen Gold- und Silberschmiedehandwerks vor und nach den Markomannenkriegen -- Vergoldung, Filigran und Preßblech. In H. Friesinger, J. Tejral & A. Stuppner (Hrsg.): *Markomannenkriege. Ursachen und Wirkungen. VI. Internationales Symposium "Grundprobleme der frühgeschichtlichen Entwicklung im nördlichen Mitteldonaugebiet" Wien 23.-26. November 1993,* pp. 99-107. Brno, Archäologisches Institut der Akademie der Wissenschaften der Tschechischen Republik.

-- 1997. Neue Forschungen zu den beiden Zierscheiben aus dem Thorsberger Moorfund. *Germania* 75 (1), pp. 69-99.

-- 1999a. Kaiserzeitliche germanische Traditionen im Fundgut des Grabes des "Chef militaire" in Vermand und im Childerich-Grab in Tournai. In T. Fischer, G. Precht & J. Tejral (Hrsg): *Germanen beiderseits des spätantiken Limes,* pp 47-61. Spisy Archeologického Ústavu AV_R Brno 14. Brno, Archeologický ústav AV_R.

-- 1999b. Granat, Karneol, Topas, Onyx und Bernstein -- Zu schmucksteinverzierten Gegenständen der Römischen Kaiserzeit in Nord-, West- und Ostmitteleuropa. *Bericht der Römisch-Germanischen Kommission* 79, 1998, pp. 260-275.

von Carnap-Bornheim, C. & J. Ilkjær 1996. *Illerup Ådal 5: Die Prachtausrüstungen.* Jutland Archaeological Society Publications XXV:5. Højbjerg.

-- 1999. Import af romersk militærudstyr til Norge i yngre romertid. In I. Fuglestvedt, T. Gansum & A. Opedal (eds): *Et hus med mange rum, Vennebok til Bjørn Myhre på 60-årsdagen,* Vol. A, pp. 135-148. AmS-rapport 11A. Stavanger, Arkeologisk museum.

Collis, J. 1997. *European Iron Age.* London, Routledge.

Cunliffe, B. 1988. *Greeks, Romans and Barbarians. Spheres of Interaction.* London, Batsford.

Dušek, S. 1992. *Römische Handwerker im germanischen Thüringen. Ergebnisse der Ausgrabungen in Haarhausen, Kreis Arnstadt.* Weimarer Monographien zur Ur- und Frühgeschichte 27. Stuttgart, Theiss.

Geary, P. 1988. *Before France and Germany. The Creation and Transformation of the Merovingian World.* Oxford, Oxford University Press.

-- 1996. *Die Merowinger. Europa vor Karl dem Großen.* München, C.H. Beck.

God_owski, K. 1995. Das "Fürstengrab" des 5. Jhs. und der "Fürstensitz" in Jakuszowice in Südpolen. In F. Vallet & M. Kazanski (eds): *La noblesse romaine et les chefs barbares de III^e au VII^e siècle,* pp. 155-179. Mémoires publiées par l'Association Française d'Archéologie Mérovingienne IX. Paris.

Häusler, A. 1979. Zu den sozialökonomischen Verhältnissen in der _ernjachov-Kult-ur. *Zeitschrift für Archäologie* 13, pp. 23-65.

Harhoiu, R. 1997. *Die frühe Völkerwanderungszeit in Rumänien.* Archaeologia Romanica 1. Bukurest, Editura Enciclopedic_.

Heather, P. 1996. *The Goths.* The Peoples of Europe. London, Blackwell.

Hedeager, L. 1992. *Iron-Age Societies. From Tribe to State in Northern Europe, 500 BC to AD 700.* Oxford, Blackwell.

Jørgensen, L. 1995. Stormandssæder og skattefund i 3.-12. århundrede. *Fortid og Nutid* 2, 1995, pp. 83-110.

Jørgensen, L. & A. Nørgård Jørgensen 1997. *Nørre Sandegård Vest. A Cemetery from the 6th-8th Centuries on Bornholm.* Nordiske Fortidsminder, Ser. B 14. København, Det Kgl. Nordiske Oldskriftselskab.

Kaul, Flemming 1991a. *Thracian tales on the Gundestrup Cauldron.* Publications of the Holland Travelling University 1. Amsterdam, Najade Press.

-- 1991b. *Gundestrupkedlen. Baggrund og billedverden.* København, Nyt Nordisk Forlag.

Lund Hansen, U. 1998a. Zur Ausstattung und sozialen Stellung runenführender Gräber der Kaiserzeit in Südskandinavien. In K. Düwel (Hrsg.): *Runeninschriften als Quellen interdisziplinärer Forschung. Abhandlungen des Vierten Internationalen Symposiums über Runen und Runeninschriften in Göttingen vom. 4.-9. August 1995,* pp. 160-179. Göttingen.

-- 1998b. Goldring. In *Reallexikon der Germanischen Altertumskunde* 12, pp. 345-361.

Lund Hansen, U. *et al.* 1995. *Himlingøje -- Seeland -- Europa. Ein Gräberfeld der jüngeren römischen Kaiserzeit auf Seeland, seine Bedeutung und internationalen Beziehungen.* Nordiske Fortidsminder Ser. B 13. København, Det Kgl. Nordiske Oldskriftselskab.

Martens, J. 1989. Wie wohnten die kaiserzeitlichen Fürsten und Völker? Einige Bemerkungen zur polnischen Wielbark-Archäologie aus einer skandinavischen Sicht betrachtet. In J. Gurby & A. Kokowski (eds): *Kultura wielbarska w m_odszym okresie rzymskim* tom II, pp. 299-312. Lublin, Universytet Marii Curie-Sk_odowskiej, Katedra Archeologii.

Myhre, B. 1987. Chieftain's graves and chiefdom territories in South Norway in the Migration Period. *Studien zur Sachsenforschung* 6, pp. 169-187.

-- 1997. Boathouses and naval organization. In A. Nørgård Jørgensen & B.L. Clausen (eds): *Military Aspects of Scandinavian Society in a European Perspective, AD 1-1300,* pp. 169-183. PNM Publications of the National Museum, Studies in Archaeology & History 2. København.

Nørgård Jørgensen, A. 1999. *Waffen und Gräber. Typologische und chronologische Studien zu skandinavischen Waffengräbern 520/30 bis 900 n.Chr.* Nordiske Fortidsminder, Ser. B 17. København, Det Kgl. Nordiske Oldskriftselskab.

Randsborg, K. 1991. *The First Millennium A. D. in Europe and the Mediterranean. An Archaeological Essay.* Cambridge, Cambridge University Press.

-- 1995. *Hjortspring. Warfare and Sacrifice in Early Europe.* Århus, Aarhus University Press.

Rieck, F., E. Jørgensen, P. Vang Petersen & C. Christensen 1999. "... som samlede Ofre fra en talrig Krigerflok". Status over Nationalmuseets Nydamprojekt 1989-1997. ("... as accumulated sacrifices from numerous warriors". Status of the National Museum's Nydam Project 1989-1997. *Nationalmuseets Arbejdsmark* 1999, pp. 11-34.

Roth, H. 1986. *Kunst und Handwerk im frühen Mittelalter. Archäologische Zeugnisse von Childerich I bis zu Karl den Großen.* Stuttgart, Theiss.

Schlüter, W. (Hrsg.) 1993. *Kalkriese -- Römer im Osnabrücker Land.* Bramsche, Rasch Verlag.

Schlüter, W. & R. Wiegels (Hrsg.) 1999. *Rom, Germanien und die Ausgrabungen von Kalkriese. Internationaler Kongress der Universität Osnabrück und des Landschaftverbandes Osnabrücker Land e.V. vom 2. bis 5. September 1996.* Osnabrücker Forschungen zu Altertum und Antike-Rezeption 1, Kulturregion Osnabrück 10. Osnabrück, Universitätsverlag Rasch.

Søby Christensen, A. 1999. Cassiodorus and the Making of a history of the Goths. *Analecta Romana Instituti Danici* XXVI, 1999, pp. 173-177.

Wells, P.S. 1999. *The Barbarians Speak. How the conquered peoples shaped Roman Europe.* Princeton, N.J., Princeton University Press.

Michael Stafford: From Forager to Farmer in Flint. A Lithic Analysis of the Prehistoric Transition to Agriculture in Southern Scandinavia. Aarhus University Press in cooperation with Kalundborg Regional Museum and the National Forest and Nature Agency, Aarhus 1999. 147 pp, 34 tables, 101 figures.

In this book, M. Stafford pursues the goal to detect changes in flint technology during the transformation from the Mesolithic to the Neolithic in south Scandinavia c. 4000 BC. The book is a much welcomed contribution to the research in this much debated transitional period as it focuses on aspects that have not previously been systematically examined. Stafford is seeking data "with which to evaluate precisely how the Mesolithic foragers and Neolithic farmers differed" (p. 13).

Flint technology reflects the behaviour of its masters: The knowledge about where to obtain suitable raw materials, and what tools should be used for preparing them, reveals the knowledge and tradition of the producers. The types of flint artefacts produced indicate the need for specific tools to manage production and consumption. The flint manufacturing process itself implies a number of operations, all carried out on the basis of learning and practice. By studying the flint technology one should therefore be able to answer questions regarding cultural continuity and change.

The author presents his project in Chapter 1. He studied primary material from eight old and new excavations in the Åmosen bog, Western Zealand, including the Muldbjerg settlement excavated by J. Troels-Smith 1951-66, the Præstelyngen settlement excavated under the supervision of J. Troels-Smith 1966-67, and sites excavated by A. Fischer in the 1980s. As a sort of middle-Mesolithic reference site, he includes a settlement find, Flækkemagle, of the Kongemose Culture in the Åmose basin. Also included is material from the stratified shell midden at Norsminde in Eastern Jutland, excavated by Søren H. Andersen. For the time being, the Åmose sites and Norsminde layers make up the group of Danish assemblages that can most exactly be related to the transition from Ertebølle to the TRB Culture, and which can be tied on the time scale as a string of pearls by means of C-14 dates.

In Chapter 2, 'The Cultural and Theoretical Framework', Stafford presents an up-to-date survey of the research situation concerning the late Mesolithic and early Neolithic in South Scandinavia and gives a review of theoretical explanations for the Meso-Neo transition. In Chapter 3, M. Stafford says that generally, research has been focussing on the pottery from the time of the Meso-Neo transition, and 'the analysis of flint assemblages has suffered as a result' (p.42). In that chapter he presents the various flint tools belonging to the late Ertebølle and the early Neolitihic TRB Culture.

Being an experienced flint-knapper, M. Stafford has a good background for characterising working methods (soft and hard techniques) and for the classification of waste material accumulating during the production of flint tools. In Chapter 4 he presents his methodology comprising six measurements and nine technological field values for the analysis of flint debitage and retouched flake and blade tools, including attributes such as stepping intensity, edge outlines, length of working edge, percussion technique, etc.

The analyses are presented in Chapter 5 where the different attributes of the flint material are being compared. Although there are some differences between the material from the Åmose sites and material from the layers at the Norsminde shell midden (weight of flint cores, length of blades), there are general trends through time at both locations like the increase in flake technique and the decrease in blade technique from Meso to Neo. The technical differences and similarities between the two periods are evaluated and interpreted in Chapter 6. The differences are summarized as follows: 1) A change from blade to flake tools, 2) a shift from soft percussion technique to hard-hammer flaking, 3) more scrapers in the TRB assemblages, 4) the appearance of polished flint axes in the early Neolithic.

Interesting are also the similarities between late Mesolithic and early Neolithic assemblages: 1) The production of largely the same retouched tool types result in debitage that is virtually indistinguishable between periods, 2) flake axes were made in both periods, 3) there was a continuous production of blades in the early Neolithic, although they occur in less quantities than before.

M. Stafford presents some possible reasons for the gradual decline in the use of flint blades and the change from soft to hard percussion technique. It sounds plausible that blades were preferred by mobile hunters who had to carry with them a stock of blanks that could be used for making arrow-heads as well as other tools. The need for multi-transformable, light material for making tools was not so pronounced among sedentary people. The scarcity of antler material for making punches at the end of the Mesolithic, due to a decrease in the number of antler-bearing game, is presented as a possible cause for the change from soft to hard hammer technique. During the following early Neolithic period, however, there was an intense production of flint axes using punch-technique, for which antler punches must have been supplied.

If the author had chosen other sites from the early Neolithic than Muldbjerg, being a site especially used for hunting and fishing activities, he may also have found that at inland sites of this period, the debitage is very much different from what is usually found at the Ertebølle settlements. Especially at sites where flint axes were produced. The numerous flakes result-

ing from this working process provided suitable blanks for scrapers, flake axes and knives. Re-using the debitage from the flint axe production was probably done for simple practical reasons.

Concerning continuity, there is a problematic attempt to link the late Mesolithic, so-called 'specialized core axes' with the pointed-butted flint axes of the early Neolithic. It is rather a detail, but in fact we are speaking of two different tools, an adze and an axe, respectively.

Looking at the broad similarities between flint industries on both sides of the Meso-Neo transition, M. Stafford opposes the perception that there was a radical change in cultural development. He can finally dismiss immigration as explanation for the introduction of agriculture. His opinion is valid as far as the production of the flint tools is concerned, and his analysis has given us a much clearer picture of the development from Ertebølle to TRB regarding this aspect of the archaeological source material. The majority of continuous, flint technological traits, and the use of basically similar tools, speak in favour of population continuity and make us see the introduction of agriculture and husbandry as an event taking place among the indigenous people of south Scandinavia who acquired the means of food production from neighbouring peasant communities.

The author goes further, as he advocates for a long, gradual development towards sedentism. Novelties that appear during the rather long time-span, such as imported amphibolit shaft-hole axes, the use of pottery, the beginning of agriculture, introduction of polished flint axes (which he finds connected with the early appearance of imported metal axes), erection of the first grave monuments - all are given equal priority in his model of gradual change towards a more sedentary and hierarchial society. There is a remarkable statement about the evidence 'suggesting that the neolithisation of south Scandinavia had a largely social, not subsistence-based, cause' (p. 134). Like Ian Hodder he sees 'the Neolithic as a *symbolic* transformation within indigenous cultures, of which the control of domesticates was but a part' (p. 135).

M. Stafford is thereby much in line with the present trend in interpretative archaeology. There are many aspects of the Neolithic societies that cannot be explained on the background of subsistence needs but are more likely reflecting social ranking and may be seen as symbols thereof. So why not explain the beginning of the Neolithic along the same lines?

A few things prevent a total acceptance of M. Stafford's conclusions: His attempt to deprive the adoption of agriculture and husbandry of its significance and to slow down the speed of change. Maybe the study of what we now know - thanks to M. Stafford - was a long-lived flint-knapping tradition on both sides of the transition has blurred the picture. If we turn to other evidence, it looks differently. Alongside the adoption of cultivated plants and domestic animals the settlement pattern changed dramatically as the first farmers started to populate inland areas that were not inhabited before. The continued use of hunting and fishing sites such as those studied by M. Stafford was only part of what quickly became a much wider settlement pattern. A new set of pottery vessels and a whole new ceramic technology accompanied the advent of agricultural food processing. The onset of new sacrificial practices at specially chosen locations was soon accompanied by the construction of status-dependant burial monuments. There began an intensive circulation of valuable objects. There is no reason to believe that the development from the beginning of the Neolithic was slow and gradual. During the first two or three centuries of the early Neolithic things were changing at least ten times faster than during the last millennium of the late Mesolithic.

The Meso-Neo transition is a fascinating event that caused accelerating change altering the society. It offers all the opportunities we may want for the study of culture change, social interaction and symbolic behaviour. - Why not call it a revolution?

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The abstract section contains condensed information on topic, methods and results. It appears as the first section of the paper, but is not typeset differently from the rest of the paper and will not be headed by the word "Abstract". The abstract should not exceed 600 characters.

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The main text should be carefully structured using headings. Three levels of headings may be used. The principal heading and the first subheading are placed on separate lines before the sections they head, the former in small caps, the latter in italics. The second subheading is placed on the first line of the section it heads followed by the text on the same line.

Notes should be kept at a minimum. They should be numbered consecutively and typed after the main text of the paper (use endnotes in your word processor instead of footnotes).

References should be given in the text: (Fischer 1989, 23) or (Fischer 1989, Fig. 9) or (Fischer 1989, 23ff., Figs. 8-9). If more than two works are referenced together, semicolons should separate them: (Fischer 1989; 1991) or (Fischer 1989; Aaris-Sørensen 1988). In references with two authors, both names should appear separated by an ampersand: (Andresen & Madsen 1993). In references with three or more authors only the name of the first author should appear followed by an et al. (Andresen et al. 1993). Normally, only family name and year of publication is used in references. In cases where publications by two different authors would appear with identical names and years, initials of the authors should be added. Where two or more publications of the same author from the same year is referenced, an "a", "b" etc. is added to the year (see below in connection with references): (Hansen 1997a; Hansen 1997b)

Figures and tables that are part of the contribution may be referenced in brackets in the text (Fig. 3, Tab. 2) or directly in the text in unabbreviated form: figure 3 and table 2.

For radiocarbon dates it must be clearly indicated, whether they are given in conventional C-14 years or as calibrated dates. For uncalibrated dates use bp (before present = 1950), and not bc/ad recalculations since they are in fact meaningless. For cal-

ibrated dates please use BC and AD. When quoting individual dates, a reference must be given to laboratory number, e.g. (K-5030). For calibrated dates, please refer to the calibration curve in question. If a calibration program has been used by the authors, a reference to this program should be provided. Radiocarbon dates may be quoted in the following way:

2230 ± 70 bp (K-5030). Calibrated (Stuiver & Pearson 1993) ± 1 st. dev.: 390-195 BC.

Address section

The address section should for each author contain name, institution, and full address including email address and www homepage if available.

References

All references should be listed alphabetically and (for the same author) chronologically by year of publication. If necessary, add "a", "b", etc. to mark different publications from the same year. You must give full bibliographical references. Do not use et al. (et al. is only used in the text), but list all contributors. Do not abbreviate periodical data (e.g. not JDA but Journal of Danish Archaeology). Always provide publisher and place of publishing for books.

Note the following reference styles for journal articles (1); articles in edited books (2); articles in serials (3); monographs in serials (4); and books (5):

1 Bennike, Pia 1990: Human Remains from the Grøfte Dolmen. Journal of Danish Archaeology 7, 1988, pp. 70-76.
2 Roesdahl, Else 1988: Vikingetidens befæstninger i Danmark - og hvad siden skete. In Torsten Madsen (ed.): Bag Moesgårds maske, pp. 203-216. Århus, Aarhus Universitetsforlag.
3 Hvass, Steen 1988: Jernalderens bebyggelse. In Peder Mortensen & Birgit M. Rasmussen (eds.): Jernalderens stammesamfund. Fra Stamme til Stat i Danmark 1. Jysk Arkæologisk Selskabs Skrifter 22, pp. 53-92.
4 Ørsnes, Mogens 1988: Ejsbøl I. Waffenopferfunde des 4.-5. Jahr. Nach Chr. Nordiske Fortidsminder, Serie B 11.
5 Aaris-Sørensen, Kim 1988: Danmarks forhistoriske dyreverden. Fra istid til vikingetid. København, Gyldendahl.

TECHNICAL GUIDELINES FOR CONTRIBUTIONS

Preliminary submission of contribution

Three copies of the manuscript including tables, figure captions and figures (copies of a quality suitable for referee purposes) should be submitted. The text of the manuscript should be printed double-spaced with a left margin of five centimetres. All pages must be numbered. The beginning of each new paragraph should be clearly visible in the print layout. Use a pencil in the margin to mark the intended level of the headings (e.g. 1, 2 3). The approximate position of illustrations and tables should be indicated in the margin of the text.

Submission after acceptance

If your contribution is accepted you are requested to submit all material in a quality and format suitable for a computer based production of the journal. This implies the following:

Text. The text must be delivered on either a Macintosh or an IBM-compatible diskette. Files from Microsoft Word or Word Perfect are acceptable, regardless of version. If you cannot deliver your text in the formats of either of these two word processing systems, you should contact the editors for alternative arrangements. Please keep the following golden rules in mind:

- Never use spaces to lay out your text. The only time to use the spacebar is for that one important space placed between each word. Use the replace facility of your wordprocessor to ensure that there is no space before "," or ".", and that two consecutive spaces never occur.
- Never use the tabulator to lay out your text.
- Never ever apply hyphenation to your text. Only obligatory hyphens should be present.
- Never try to anticipate the formatting of the text as it appears in the Journal (i.e. do not use capital letters in headings or in author names even if they appear so in JDA)
- Do not use empty lines to separate the individual paragraphs.
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Tables. Tables should be produced by way of the table functions of Microsoft Word or Word Perfect and submitted in separate files. Alternatively, tables may also be created using Microsoft Excel. When you decide on the content of a table, you should consider its final size: it may be either 86 or 178 mm wide, and the smallest font size we can use is 8 point. Experiment with the layout of your tables, and do not try to achieve the impossible. Tables that are higher than 215 mm will be broken across more pages. Table legends including the numbers should be associated with each table in the file containing these.

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of a one-column illustration is 86 mm and of a two-column illustration 178 mm; the maximum height of illustrations are 215 mm.

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