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Beaker Longhouses: Livelihood Specialization and Settlement Continuity in North Jutland

John Simonsen

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Author´s address:
John Simonsen
Museum Salling, Bråruppgade 18A
7800 Skive, Denmark

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Abstract

Within South Scandinavia, the Limfjord region of North Jutland in the 3rd millennium BC was geographically a markedly archipelagic landscape fairly open to the North Sea, with numerous islands and long streams connecting the coast to the hinterlands. Culturally, during the younger Single Grave Culture as well as during the early Late Neolithic, the people of this region certainly welcomed novel impulses from near and far. Compared with sites of the younger Single Grave Culture, however, it appears that settlements were inhabited longer from about the beginning of the Late Neolithic in this region. Around the same time, new impulses gave rise to the diversification of specializations practiced between different by settlements. This leads to the research question: could the increasing specialization among households have played a significant role in prolonging residence at many locations? Longhouses with a sunken floor in their eastern half were used for habitation in areas of the central Limfjord region. Some new investigations of sites of such longhouses at the Beaker settlements belonging to the early Late Neolithic in this region may feed into the discussion of livelihood specialization and settlement continuity.

Introduction

As a partly re-arranged and abbreviated version of a new monograph that presents insights into everyday life, its organization, and its economy in the Limfjord region during the Late Neolithic and emerging Bronze Age (Simonsen 2017), this article will roughly describe the project on which the monograph was based and summarize some of the themes it studied on sunken-floor houses. In particular, it will describe these investigated dwellings and the settlements of which they were part as a basis for discussing the relationship between growing household specialization and increasing settlement continuity.[1] The houses belong to the Late Neolithic I (LN I), a period that has been suggested to correspond to the time range c. 2350 – 1950 cal BC (Vandkilde 1996, 139pp; 2007, 75pp; 2009, 76).

A long-term research project into sunken-floor houses 2600–1600 BC

The research project on sunken-floor houses was created because an understanding of the immanent traces of ancient life in these buildings at the turn of the Neolithic is lacking, though these buildings have been recognized in the archaeological record for quite

1 For theoretical inspiration, methodological reflections, source critique and literature review, as well as references for the relevant excavation reports relating to sunken-floor houses from the Late Neolithic and the emerging Bronze Age, see Simonsen 2017, 17–49. In the present article, seven illustrations are from the monograph, while Fig. 6, Tab. 1, and Tab. 3 were made specifically for this text.

some time.[2] The entire research project, initiated by Skive Museum (now part of Museum Salling) in 1999, is broader and in all incorporates sites belonging to the younger phases of the Single Grave Culture, the following Late Neolithic period, and the emerging Bronze Age, c. 2600–1600 cal BC.[3] The central part of the Limfjord region (Fig. 1), a broad zone around the former lake Tastum Sø, and also including Glattrup to the north, defines a core area of research interest. This "Tastum Sø project" was started around 1980. Tastum I (Loc. 28) was the first house site to be found, in this case on the western banks of the now dried-out Tastum Sø which during the Late Neolithic was salty, being an inner arm of the Limfjord (Rasmussen et al.1979, 115pp; Rasmussen & Petersen 1980, 51). In addition to the settlements, this research project identified and studied graves, deposits, road tracks, and other landscape features.

In the project on sunken-floor houses, ten settlements were selected for study from the central Limfjord region: Resengaard (Loc. 36), Gåsemose (Loc. 57), Kluborg II (Loc. 41), Glattrup I/III (Loc. 38–39), Marienlyst Strand (Loc. 37), Hellegård (Loc. 33), Glattrup IV (Loc. 25), Rosgårde (Loc. 29), and Tromgade (Loc. 58), as well as Granlygård (Loc. 40) where the sites of three smaller sunken-floor houses (Houses 2, 3, & 6, fieldwork director Poul Mikkelsen) were found along with a pit (4) with important Beaker pottery (Fig. 2). In general, all of these settlements, with the exception of Kluborg II, contain contexts where Beaker pottery was uncovered. At Resengaard, Beaker pottery was found in several more or less flat-bottomed pits placed close together which could perhaps represent a sunken-floor house site. The Beaker ceramics at Gåsemose were not uncovered in the context of a relevant sunken-floor house.

By far the majority of the known house sites were placed on sand, ensuring good drainage. It seems plausible that, due to the use of low turf walls, the floors had to be sunken in order to create adequate free height below the crossbeams for the residents to live and work in the eastern areas of the east-west aligned longhouses. Both the turf walls and the sunken floors would have minimized temperature fluctuations within the houses, helping to keep the house interiors free of frost during the winter. This rudimentary climate control is due to the more constant temperature of subsoil and the decreased influence of wind chill with a lower roof. Therefore, the combination of turf walls and sunken floors can be considered an effective climatic shield. Other researchers have also stressed the insulating value of the sunken floors in particular (Nielsen, S. 1999, 126p; Sarauw 2006, 61).

A number of sunken floors belonging to the Single Grave Culture have also been excavated in the central Limfjord region. These generally have smaller dimensions than those from the Late Neolithic although, in my reading, the formation processes seem to have been approximately the same (cf. Simonsen 1987; 2006). The sunken floors of the Single Grave Culture houses also show soil patches originating from interior activities and artefact remainders with some resemblance to those of the Late Neolithic. Therefore, long ago I suggested that the Late Neolithic tradition of houses with sunken floors might very likely stem from a house-building practice that dates back to the Single Grave Culture (Schovsbo 1987, 144). The sunken floors were thus a building tradition of long duration, at least c. 900 years.

In total, more than 140 Late Neolithic and emerging Bronze Age settlements with sunken-floor houses in South Scandinavia are known. The now "classic" (LN I) Beaker houses in the Limfjord region were found at the sites Myrhøj (Loc. 11), Stendis (Loc. 96), Tastum I (Loc. 28) and Bejsebakken (Loc. 14) and published between 1973 and 2006 (Jensen, J.A. 1973; Skov 1982; Simonsen 1983; Sarauw 2006).

2 My data, collected mainly from recent excavations, are met with research questions that define my empirical objects of study, such as postholes, soil patches, pits, artefacts, and plant materials. My analytical objective concerns the creation of relations between the data in order to gain knowledge of the physical structure of the dwellings, their interior arrangements, daily life activities, production, and exchange between households.

3 It is considered vital for the study that the selected settlements derive from a rather limited area within the Limfjord region so that the observed variation cannot a priori be explained in terms of different geography. It was of paramount importance that the new investigations selected gave the highest priority to the recording of soil patches and artefacts belonging to floor horizons as this evidence is crucial for research into daily life in the longhouses. As only sites which recorded this information were included, thematic and comparative analyses of observations from these floor horizons could then be performed.

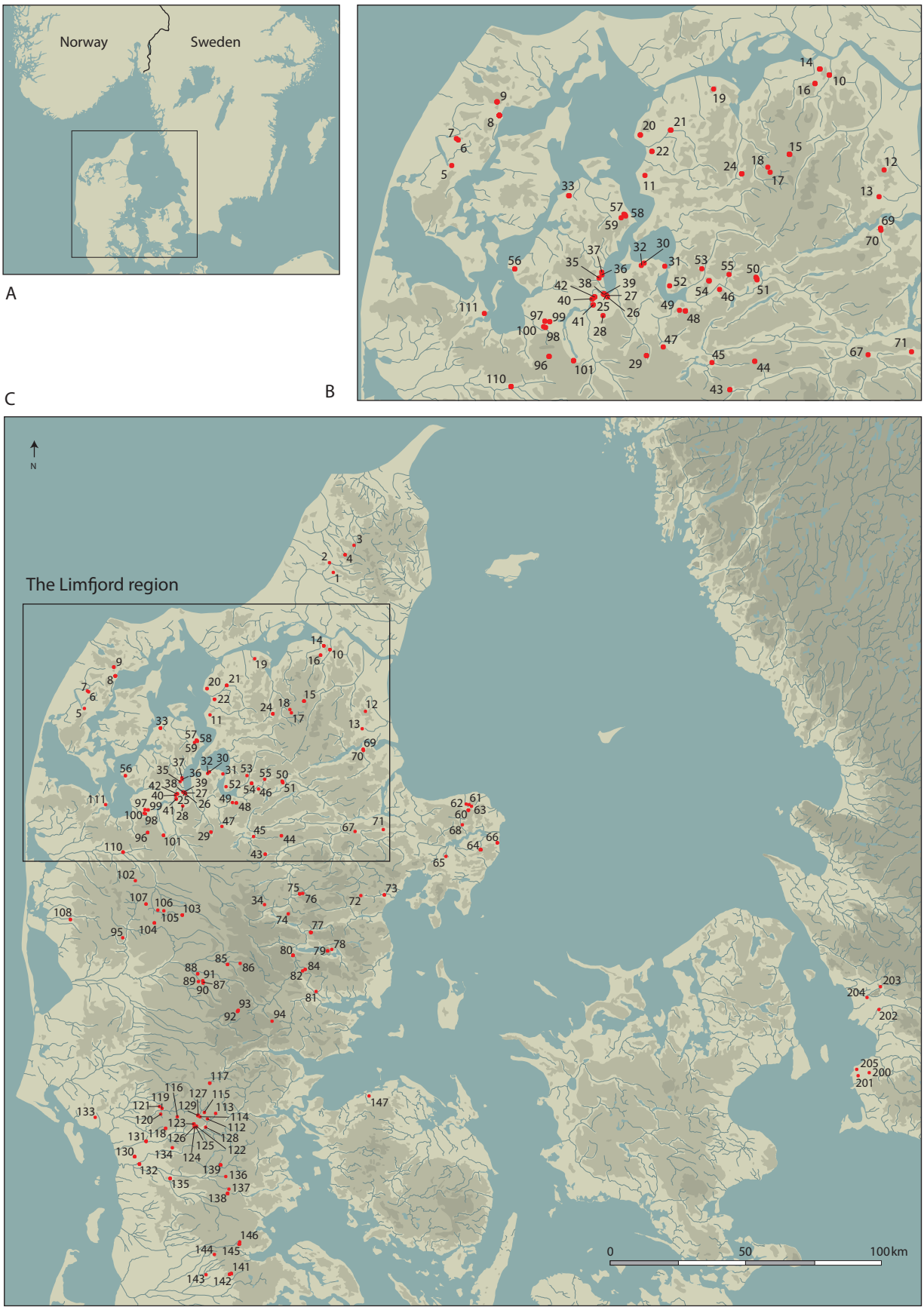

Fig. 1. A-C. Sites with sunken-floor houses in South Scandinavia from the Late Neolithic/emerging Bronze Age. The grey-tone shading on the map denotes heights of 30 m, 80 m, and 150 m. Many locations are more or less newly found and unpublished. Sources: Danish museums, the database of Fund og Fortidsminder & Wikimedia Commons. For further, including Swedish sites, see Simonsen 2017. Graphics: Lars Foged Thomsen.

Fig. 2. Granlygård (Loc. 40). Nine examples of ornamented pottery as well as a clay colander and a loom weight. For more on these finds, see Simonsen 2017, photos: Ivan Andersen.

Exploring the soil patches, pits, artefacts and plant residues observed in the floor horizons in order to find evidence of the residents' everyday doings is a central topic in the project of sunken-floor houses.[4] One essential idea has emerged, namely that the interiors of the longhouses can be considered as having been separated into a number of habitual spaces for certain activities. With regard to the ground floors in the western part of the houses, post-built dividing walls seem to have been present in only a few cases. Regarding the sunken floors to the east, post-built dividing walls were seldom present and did not separate the activities. Many different actions in everyday life seem to have been performed in these eastern areas of the dwellings.[5]

The premise I take is that most artefacts found in the floor horizons were generally used or handled near their find spot. The observation that the ceramics are often broken into rather small pieces may support this understanding because the fragmentation presumably often resulted from use of pottery on the spot. Sherds belonging to the same clay pot have often been found quite close together.

The floor horizons may frequently appear relatively poor in terms of artefacts in contrast to the secondary fills above, which sometimes contained numerous and quite varied artefacts. It is, however, necessary to clarify that no matter how interesting or exciting these objects may be, such finds above the sunken-floor horizons do not provide direct evidence of specific activities in a certain floor area of the house.

Longhouses with solely ground-level floors

Before presenting examples of the sunken-floor longhouses, some sites of characteristic two-aisled ground-level-floor longhouses investigated by Museum Salling at Beaker settlements in the central Limfjord region should be introduced for comparison; namely, two ground-floor longhouses at Glattrup IV and one at Rosgårde (Fig. 3). When constructing these buildings (as opposed to those with sunken floors), the surface soils over the entire length and width of the house were simply removed. Thereafter, the uncovered subsoil served as a floor with no application of a stamped clay surface coating. These three longhouses had almost similar ground plan dimensions. When compared with the sunken-floor longhouses, their solid timber superstructures could have been significantly higher and could have had a more hall-like appearance. Their interiors were conspicuously well-ordered and much alike, each having one sizeable sub-circular pit placed far to the east. It is my suggestion that such pits inside of the longhouses acted as cellars used in connection with the brewing of beer, serving also as a cool place of storage until the beer was to be consumed during some sort of gathering likely soon after . These three houses (with lenghts ranging from 12.4 – 14.3 m) appear to have been rather typical for certain areas of the central Limfjord region. These dimensions are, however, only a small fraction of those in buildings like the grandiose Vinge house (Johannsen 2017) in eastern Denmark. This great variability in dimensions, in my reading, is indicative of great social dissimilarities between the Lim-fjord region and the eastern parts of Denmark. These buildings were usually east-west aligned.

These two-aisled ground-level-floor structures were the most widely spread kind of houses in the South Scandinavian Late Neolithic and sites consisting of numerous combinations and numbers of these are well known (e.g. Nielsen, P.-O. 1998; Artursson 2005 a; 2005 b; 2005 c; 2009; Gidlöf, K., Hammarstrand D.K., & Johansson, T. 2006; Poulsen 2009; Brink 2013).

4 One of the most significant virtues of the sunken-floor house sites is the possibility of obtaining a broad spectrum of knowledge about daily life because recent ploughing which frequently tends to destroy ground-level floors, has often not yet reached down to the deeper levels. The longhouse ground plans in question are characterized by being divided along two axes: the east-west division into a sunken floor and a ground-level floor versus the north-south division formed by the central posts running through the middle of the interior. These divisions may influence the ordering and organization of activities. Artefacts and plant remainders in the floor horizons, sometimes plentiful, provide important information. Together with traces of house walls, dividing walls, compartments, and doorways, the vital data of artefacts, plant remainders, pits, patches, and floor layers form the point of departure for interpretations of where varying, concrete human activities may have taken place.

5 For more on the method, systematic approach, and interpretation of the floor traces, see Simonsen 2017, 220–226.

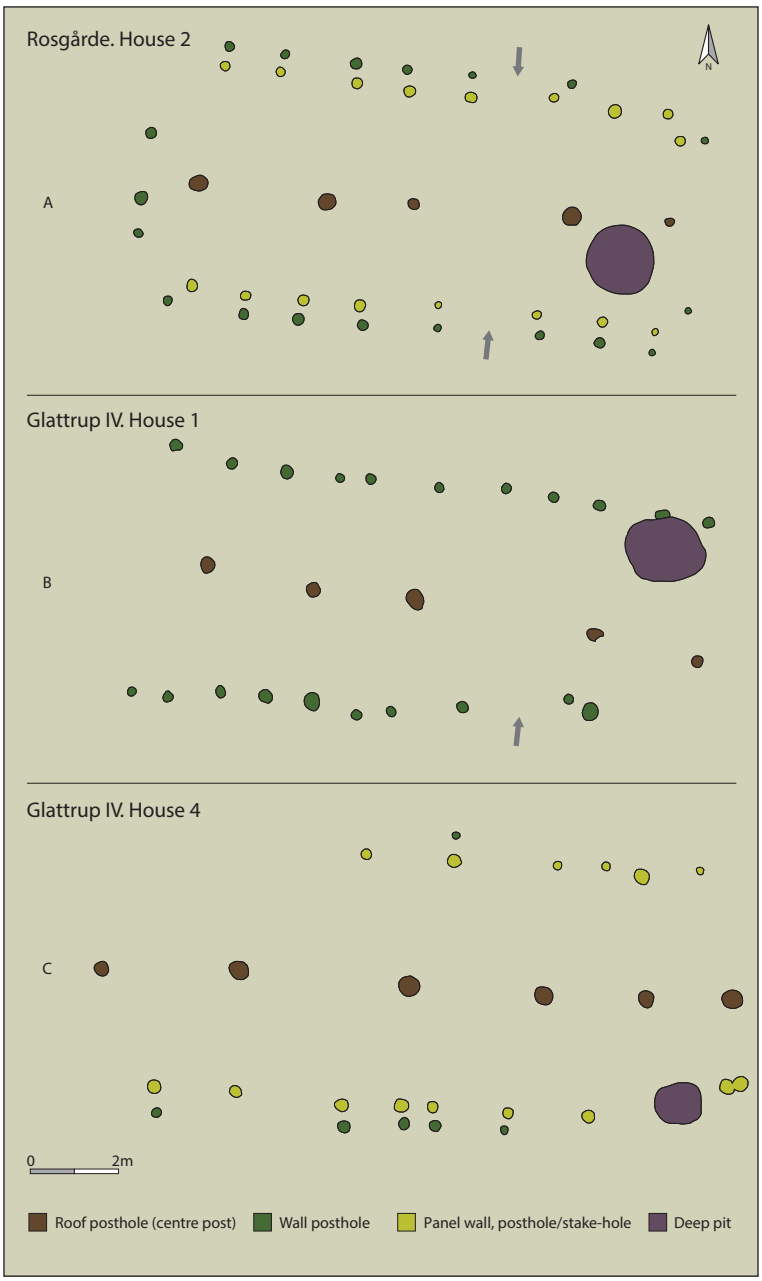

Fig. 3. Three sites (Loc. 29 & 25) of two-aisled Beaker houses supplied solely with ground-level floors from the Late Neolithic I. Cleaned. Arrows indicate entrances. In the interpretation of the author, the large sub-circular pits to the east functioned as "beer-cellars". Graphics: Lars Foged Thomsen.

Location	House	Raw length	Raw width	Ground plan	Site of fire	Large sub-circular pit, diameter
Glattrup IV	1	12.4 m	5.7 m	Trapezoid	–	1.8 m
Glattrup IV	4	14.3 m	6.6 m	Parallel	–	1.1 m
Roegårde	2	12.6 m	6.0 m	Trapezoid	–	1.6 m

To offer deeper insights into the sunken-floor longhouses and their traces of specialization, we shall in the following have a closer look at sites of Beaker houses at Glattrup IV and Hellegård.

Glattrup IV: Sunken-floor houses with deep pits and sunken fireplaces in their interiors

Digging of deep pits in Beaker longhouses with sunken floors took place surprisingly seldom, judging from the published sites in the Limfjord region. Here, pits are considered "deep" when their bottoms

are more than 0.50 m below the floor surface. Such pits are not known from Myrhøj, Stendis, or Tastum I (Jensen, J.A. 1973; Skov 1982; Simonsen 1983). Several sizeable pits have been recorded at Bejsebakken, some of which were deep. At Bejsebakken, House A66 (that in my understanding is actually two succeeding houses) was equipped with two large, deep pits (depths 85 & 84 cm), House A214 with two pits (depths 38 & 46 cm), House 170 with one pit (depth 40 cm) and, outside of a house context, Area C with Pit A732 (depth 100 cm); these pits contained various artefact remainders (Sarauw 2006, 16pp). Two of these pits in sunken-floor houses and one in a ground-level-floor house were very regular, placed in the floor peripheries, and had the same characteristics of nearly vertical sides and a flat bottom (Sarauw 2006, 52). Interestingly, traces of organic material, likely wood lining, were observed in the aforementioned Pit A732 (Sarauw 2006, Fig. 22). Outside the Limfjord region some deep, steep-sided pits are known from Lindebjerg on Funen (Jæger & Laursen 1983).

With the exception of Glattrup IV, no observations of large, subcircular, deep, steep-sided pits exist among the newly published locations with sunken-floor houses – Hellegård, Tromgade, Marienlyst Strand, Granlygård, Rosgårde, and Glattrup I/III. From this perspective, the massive presence of these pits inside the three sunken-floor longhouses at Glattrup IV really stands out as unique among the locations in South Scandinavia.

At Glattrup IV (Loc. 25), three two-aisled sunken-floor longhouses (3, 5 & 7) and the two above-mentioned two-aisled ground-level-floor houses (1 & 4) were found when Kurt G. Overgaard of Museum Salling excavated in 1999. In the following text, Houses 3 and 7 will be described in more detail.

The terrain in the vicinity of the trapezoidal House 3 was nearly flat and the alignment chosen for the sunken-floor building was almost E-W (Fig. 4). By the time of investigation, a central sunken floor area lay at a depth of 24 cm, but the original depth beneath the old land surface must have been significantly greater. Postholes of five centre posts clearly belonged to traces of the two-aisled construction. Many wall postholes were preserved on the northern as well as on the southern long side of the house, while a few were found in its eastern and western gable ends. The wall outlines of this building are some of the best preserved among known sites from the Limfjord region. Almost regular intervals between the postholes appeared, in particular, in the western portion of the northern long side. The posthole depths and cross-sections of both the wall and centre posts varied somewhat. The building was clearly broader at the western end by nearly one metre. A sizeable pit and a deeply sunken fireplace are interesting in terms of the activities performed within the house.

The terrain in the vicinity of House 7 was likewise almost flat and the alignment chosen for the sunken-floor building was almost E-W (Fig. 5). By the time of investigation, a central sunken floor area lay at a depth of 20 cm, but the original depth beneath the old surface must have been significantly greater. West of the sunken floor, three postholes along the central longitudinal axis marked out traces of the two-aisled construction. In the sunken floor itself, no postholes along this axis were observable whereas immediately east of the sunken floor a single, preserved posthole likely stems from a roof-bearing post. The posthole just west of the sunken floor had an extraordinarily large surface diameter; it could have been the basis for a really massive wooden post with the capacity to carry the weight of a large part of the roof, including that portion of the roof to its east, thus possibly providing a great deal of free room for specific activities in the sunken floor area.

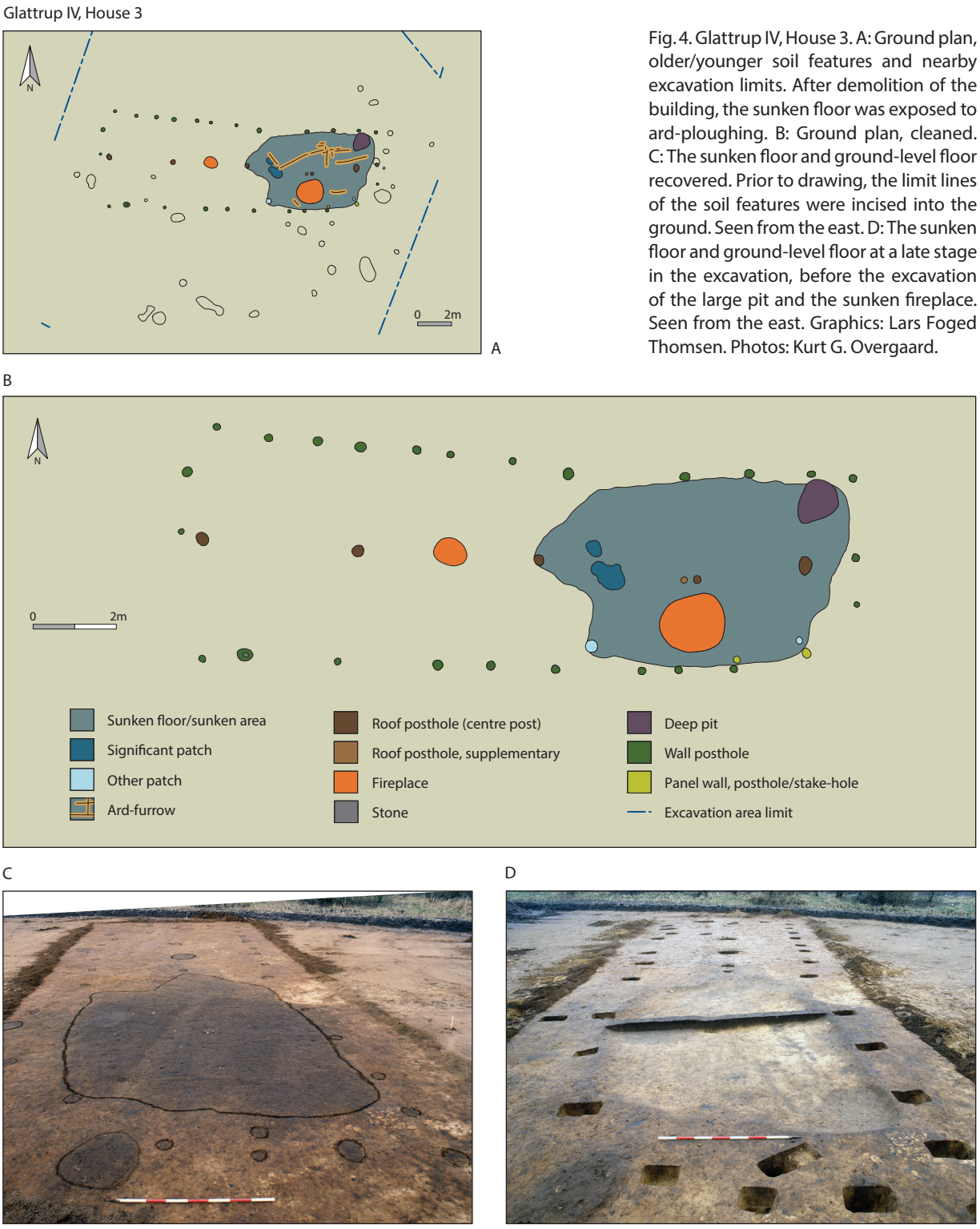

Fig. 4. Glattrup IV, House 3. A: Ground plan, older/younger soil features and nearby excavation limits. After demolition of the building, the sunken floor was exposed to ard-ploughing. B: Ground plan, cleaned. C: The sunken floor and ground-level floor recovered. Prior to drawing, the limit lines of the soil features were incised into the ground. Seen from the east. D: The sunken floor and ground-level floor at a late stage in the excavation, before the excavation of the large pit and the sunken fireplace. Seen from the east. Graphics: Lars Foged Thomsen. Photos: Kurt G. Overgaard.

During fieldwork at House 7, little could be clarified directly with regards to the walls. Two postholes are thought to mark out the traces of an inner wall on the northern long side.. Judging by the placement of these postholes in relation to the northern and southern edges of the sunken floor and the very precise outline of the sunken-floor in general, it is possible that the eastern part of the building had parallel long side walls. The placement of Sunken Fireplace A and Pit E point to a broadening ground plan towards the west. The preserved length of the building was more than 13 m and it may originally have been around 16 m inlength. The raw house width

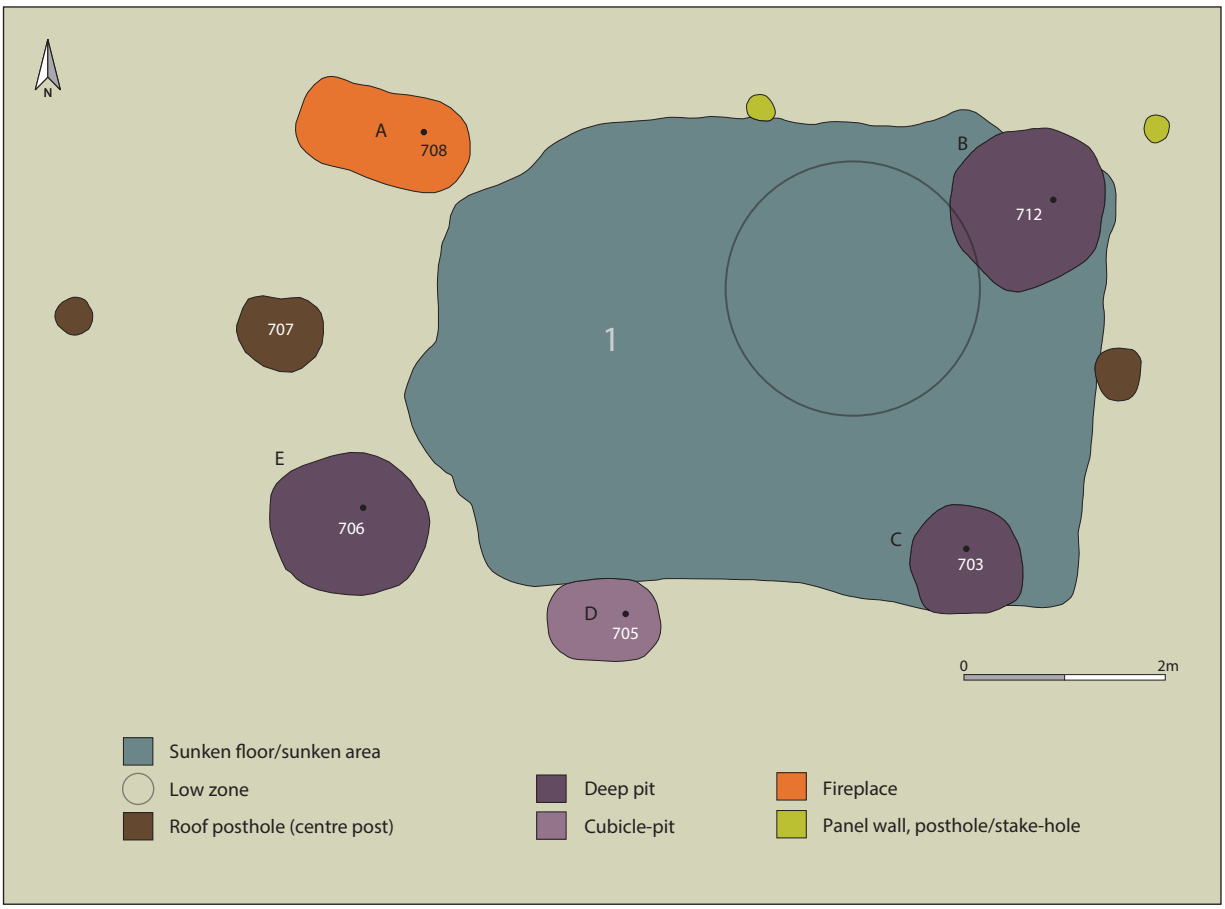

Fig. 5. Glattrup IV, House 7. A: Ground plan, cleaned. The westernmost hole of a centre post not shown. Graphics: Lars Foged Thomsen.

would likely have come close to 6 m. No traces of compartments, dividing walls, or doorways were found.

I presume that before the impact of postdepositional processes, the sunken floor could have reached the eastern edge of the sunken fireplace and Pit E or even a little further to their west. The lowest floor part, which I term "low zone", was observable northeast of the central part of the remaining sunken floor. A moderate number of finds belong to the secondary fills above the sunken floor. Other finds stem from the pit fills and the large posthole (707). The fill of this latter feature contained 3 potsherds, 3 pieces of worked flint, and 1 piece of burned flint. The fireplace and the large, almost cylindrical pits are described below (Fig. 6).

Sunken Fireplace A was sub-rectangular (surface length of c. 1.65 m and depth of c. 0.90 m). The fill consisted of nearly horizontal lighter and darker layers of sandy soil with pieces of charcoal. Areas of its vertical sides had a blackish appearance, presumably coloured by use of the hearth, presumably coloured by reducing conditions during the use of the hearth. Large, sub-circular Pit B (surface dimensions of c. 1.64 x 1.50 m and depth c. 1.15 m) that was practically in line with the sunken floor contour to the east might indicate that it was close to a wall. Numerous tiny flint pieces could stem from removal of flint-chipping waste when filling up the pit. Large, sub-circular Pit C (surface diameter c. 1.10 m, depth merely c. 0.50 m) appeared as if it followed a strict wall line, in this case the south side of the house. Large, oval Pit D (length E-W c. 1.20 m, preserved width c. 0.90 m, depth c. 0.85 m) appears to be in line with the wall, but placed outside the sunken floor in contrast to the two previously mentioned pits. In the lower part of large, sub-circular Pit E (diameter c. 1.5 m, depth c. 0.85 m) there were areas with traces of charcoal. The remnants of clay pots were found in fills from four of the five sizeable

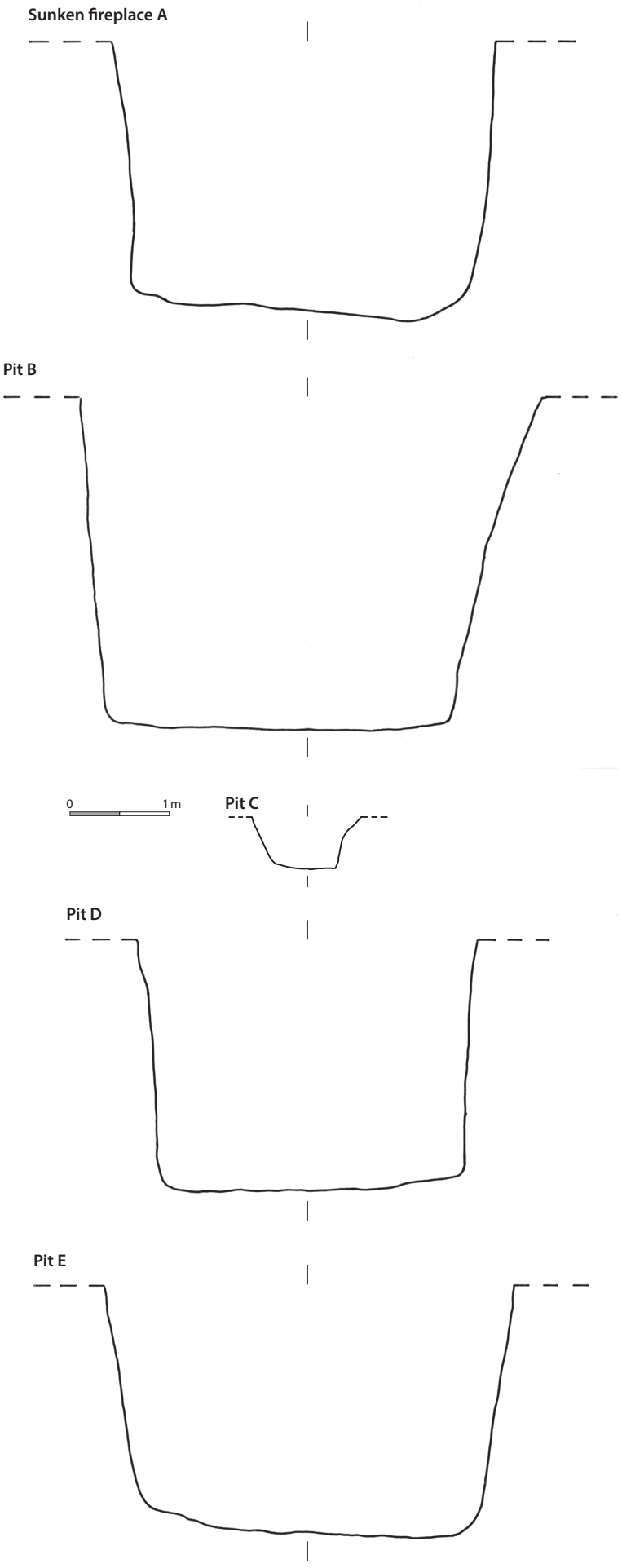

Fig. 6. Glattrup IV, House 7. Sunken Fireplace A: Oblique section, seen from almost north. Pit B, D, E & C: E-W sections, seen from the north. Fieldwork drawing by Kurt G, Overgaard, final drawing by the author.

pits. With the conspicuous placement of these pits around the sunken-floor periphery, I propose that much of the sunken floor had been incorporated into one large activity space.

Certain livelihood strategies and the need to establish sizeable deep cellar pits and deep sunken fireplaces in the floor areas obviously influenced the architecture of the longhouses. And yet, what is it about these large pits that leads me to suggest that brewing took place on some scale in all three longhouses?

The three large, sub-circular pits (B, D, & E) in the site of House 7 at Glattrup IV were very carefully constructed. For instance, Pit B in the northeast corner was so voluminous that it would have allowed a person to descend, carry out work, and arrange things within its confines. The workmanship of the pit digging was indeed remarkable in more ways than one. The sides were cautiously dug into the sandy subsoil so that the sides deviated only slightly from the vertical. I presume that a wooden panel around the inner sides (packed perhaps with some tightening organic material behind, e.g. bark) could have been a reasonable solution to keep the pit walls stable. And yet it must be emphasized that, during fieldwork, substantial traces of former construction work on the sides of the many sizeable pits in the three sunken-floor houses at Glattrup IV were not observed. In the case of Pit B, some small, almost regularly occurring, darker soil patches were observable on the upper part of the sides of the pit. These patches possibly represented traces of a no-longer existing wooden construction around the inner perimeter of the pit. Pressure from the side walls of the pit towards its inner area could have been counterbalanced by a circle of well-proportioned stakes. If slightly widening towards their upper parts and densely placed, these stakes would presumably resist the pressure from the walls.

The unusually level pit bottoms also call for attention. The digging tools, possibly of wood, are unknown to us but must have been used with utmost care to level and finish the bottoms without simultaneously damaging the pits' sandy sides. The bottoms of Pits B, D and E were possibly covered – possibly with mats or wooden planks – because no major damage to the subsoil sand was observable. I assume that solid, flat wooden constructions covered several of the interior pits at Glattrup IV and allowed the residents to move about in these floor areas. This would, at the same time, have enabled some of them to function properly as cellars with low temperatures, making them ideal for beer brewing.

All in all, charred cereals, various weed seeds., and a few plant remains from meadow, wood, heath, and other biotopes were found in the three sunken-floor houses at Glattrup IV (Henriksen 2001, 17–22; Simonsen 2017, Fig. 5.17.B). It is noteworthy that while the cereals were mainly found in floors layers and soil patches containing heat-impacted stones at the somewhat younger Resengaard settlement (e.g. House 1), the charred cereals at Glattrup IV were instead discovered in contexts within the sizeable interior pit arrangements.

Thick-walled potsherds from very large beakers with lightly curved sides and horizontal cordons on their rims are finds of particular interest in the sunken-floor houses. Some have been partly reconstructed in drawings. An expressive example (GT145ad) derives from House 3. It was relatively thick-walled (10 mm) and supplied with two horizontal cordons (the upper 2 mm thick, the lower 4 mm thick). Combined, these traits made a very solid upper portion of a vessel with an outer rim diameter of c. 24 cm (Simonsen 2017, Fig. 3.65.A). Such large vessels could have served well as containers for cereals like barley.

In House 7, sherds of at least 14 clay pots came from the primary fills of the pits, the sunken fireplace, and the secondary fills above the sunken floor. On some sherds there are faint remnants of

ornamentation including notch-stamped decorations, cardium impressions, and spatula impressions. The remains of a relatively large, open bowl stem from a pit immediately east of the house.

The numerous thin-walled potsherds from small, open cups with straight or moderately rounded sides and occasional Beaker ornamentation found in the Glattrup IV houses are also of particular interest. Many of these are rim sherds, and some have been partly reconstructed in drawing. An example (GT708aa) is formed from two adjoining potsherds found in Sunken Fireplace A of House 7. It had been thin-walled (down to 3 mm) and rather shallow; with a rim diameter of c. 8 cm it thus appears relatively wide (Simonsen 2017, Fig. 3.65.C). Some of these small cups could well have been used for the consumption of liquids. Archaeometric analysis of the Glattrup IV ceramics (the assemblage of which that stands out among other Beaker pottery assemblages in the central Limfjord region) is planned, possibly also in relation to residue analysis if well-preserved residues are found.

The intensive analysis of ceramics from sunken-floor longhouses at Resengaard revealed that when the pots used inside a house were broken, most potsherds were removed from the house floors; however, some of these fragments were often redeposited later as part of secondary fills in the sunken areas of the same house after its abandonment and destruction (Simonsen 2017, 155–161).

At Glattrup IV, therefore, a confluence of observances support the idea that production of beer took place on site (Simonsen 2017, Fig. 4.56–4.60):

- Charred Barley (and other cereals) in the interior pit arrangements
- Large ceramic vessels (possible cereal containers)
- Small ceramic cups (possibly used for consuming beverages)
- Exceptionally large, deep pits (providing a constant, cool temperature)
- Unusually level pit bases (allowing liquid-filled vessels to stand stably)
- Sizable sunken fireplaces (suitable for heating a mash tub)

Although other possibilities cannot be entirely excluded, the brewing of beer at a relatively large scale and the short-term storage of beer were, in my interpretation, very important aspects of a household's livelihood strategy and hence the digging of such large pits would have had much meaning. The pits were supplied with a large, flat bottom so that jars containing fluids could be placed in an upright position and would not topple over during brewing.

In fact, the basic production materials of beer were present at the settlement, as evidenced by the charred barley. The fact that these pits were such dominant traits of the ground plans of the longhouses and that their functions had obviously influenced the longhouse architecture might further support the notion that the households in this particular area carried out specialized activities of an exceptional nature.

Where did the varying stages of the brewing take place? Judging by the interior arrangements of all three sunken-floor longhouses at Glattrup IV, I propose that both the western and eastern parts of House 7 were used for certain steps in the brewing process. In the western part of the longhouse, these could largely have been the cleaning of cereals, maceration, malting, further cleaning, drying of the malt, placement of the malt in a mash tub (clay vessel), and transportation of the malt in this vessel to the sunken fireplace in the eastern part of the building. There, the next brewing steps could have

taken place: gradual heating, moderate boiling, cooling, and finally fermentation in the cool pit.

To my knowledge, there have been no reports of charred, germinated/malted barley grains from find contexts in the Scandinavian Late Neolithic. This is also the case for Glattrup IV but, as outlined above, we should hardly anticipate such finds here because the malting cannot be expected to have taken place near the sunken fireplaces in the longhouses. It should be remembered that the organization and placement of production facilities in the longhouse interior is decisive as to whether we should expect finds of carbonized malted grains or not.

The fact that several large cellar pits were present in House 7 might perhaps point to the possibility that parallel brewing activities could have taken place; for instance in Pits B and E. One sunken fireplace would serve to gradually heat the mash. Even if stored at cellar temperatures, the finished beer would only last a few days before beginning to deteriorate. It would not have been possible to complete a second round of beer production using the same set of vessels before the beer that was produced during the previous round became unusable (pers. comm. Erik Drenth). Parallel brewing processes may therefore have been necessary to obtain the required quantity of beer for a gathering or feast.

There are, to my knowledge, currently no similar studies that could support the suggestion of beer brewing and cool storing in the Glattrup IV houses. No pollen analyses have been performed on the relevant contexts. However, a "cylindrical" pit in South Scandinavian contexts was first proposed to be related to beer brewing in the presentation of the two-aisled House 92 at Fosie VI (Björhem & Säfvestad 1989, 55, 92 & 108; Sarauw 2006, 61). Later, cylindrical pits were also recorded at Bejsebakken and were likewise interpreted as being related to beer brewing (Sarauw 2006). During the excavation of Houses 3 and 5 (House 7 was found somewhat later on) at Glattrup IV, Kurt Overgaard and his team already suggested that brewing had taken place in these two buildings.

The notion that beer drinking was likely associated with the Beaker phenomenon has long been debated (e.g. Burgess & Shennan 1976, 309pp; Harrison 1980:104p). The question of alcoholic beverages has later been discussed by many researchers (e.g. Sherratt 1987, 96; Vander Linden 2001, 47; Sarauw 2008, 87p). In a recent publication that includes a systematic study of residues on Corded Ware Beakers in the Netherlands, it is stated that the "analysis of the use of Corded Ware ceramics from settlement sites in Noord-Holland showed that beakers, often with cord decoration, were most often used as cooking vessels" (Beckerman 2015, 220) rather than used for beer consumption. On the other hand, evidence from the use of some Maritime Beakers for alcoholic beverages is strong in Iberia (Beckerman 2015, 217; Guerra Doce 2006, 249–251; 2014, 761).

The documentation of beer residues is still shrouded in some uncertainty in South Scandinavian finds. The presence of the remainders of beer has been argued on the basis of starch grains found in a food crust of a clay pot in a grave belonging to an early phase of the Single Grave Culture at Refshøjgård in Jutland (Klassen 2005, 39pp). Malted or germinated grains from the Danish Neolithic have, to my knowledge, not yet been discovered. Evidence of other alcoholic beverages in the region has been recovered. Within an oak coffin grave from the Older Bronze Age period II at Bregninge in Zealand, a crust at the bottom of a clay pot contained a great deal of pollen from Tilia and Filipendula and some from Polygonaceae and Compositia, all considered to derive from honey, and hence it has been suggested that "the beaker contained mead" (Nielsen, S. 1978 a:32;

1978 b: c.f. 15pp; Beckerman 2015, Table 5.3). From the Older Bronze Age, a thick sedimentary layer of a fermented beverage at the bottom of a birch bark bucket was found in the woman's grave in Egtved in Jutland (Brøndsted 1966:59). It seems to represent something between beer and mead (Dickson 1978:111; Koch 2001:27pp; Klassen 2005:39).

Hellegård: Sunken-floor houses with numerous scrapers and other tools in their interior

The Hellegård Beaker settlement (Loc. 33) with two houses came to light in 1998 when Kurt G. Overgaard was carrying out an investigation for the Salling Museum in the immediate vicinity of a grave barrow. The sunken floors belonging to a longhouse, House 122, as well as that of a very short building, House 35, were found close together. The digging of several additional trial trenches and minor excavation areas nearby failed to yield any traces of further sunken-floor houses.

In House 122, recent ploughing had presumably destroyed many postholes of the wall construction (Fig. 7). In the sunken area, the absence of severe disturbances made more precise observations possible, and later fills in particular protected the sunken floor. Although ard-ploughing in the period following the demolition of the house intruded into the floor, it does not appear to have disturbed the general features of the sunken-floor horizon, its soil traces, or artefacts significantly.

The terrain in the immediate surroundings was almost flat and the house was nearly E-W aligned judging by the outline of the sunken floor. By the time of the investigation, a central sunken floor area lay at a depth of 43 cm but the original depth beneath the old surface would have been greater.

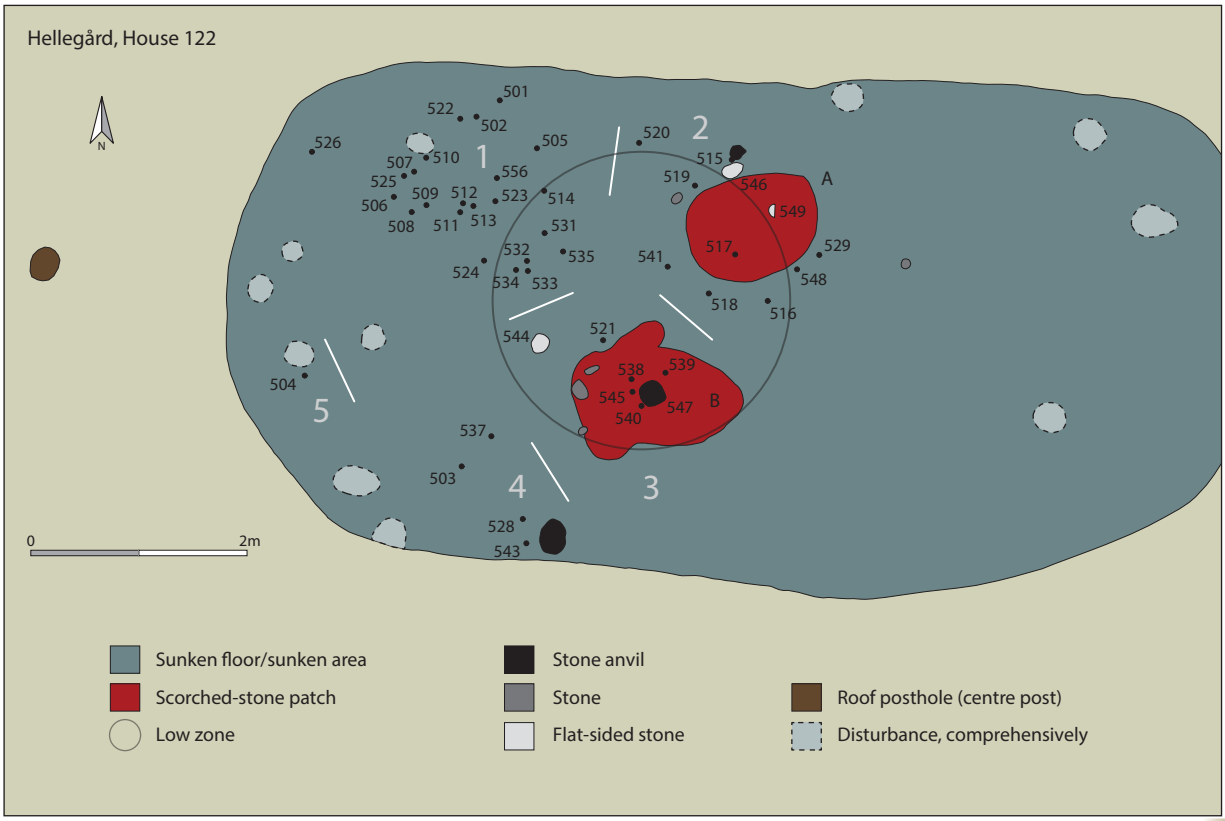

Fig. 7. Hellegård (Loc. 33), House 122. A: ground plan, cleaned. Five activity spaces (1–5) are suggested (Simonsen 2017, 285pp). Apart from the stone anvils and scorched stones, the artefacts found in situ in the sunken-floor horizon overall involve very many find spots: Scrapers, some broken: 501–503, 505–514, 518–519, 523–525, 531–535, 537, 541, and 545. Flint rough-out, possibly for a chisel: 521. Flint dagger fragment of a blade tip: 522. Stones with flat side: 540 and 544. Stone hammer, sub-quadratic: 543. Smoothening stone, flat-sided: 546. Some 200 tiny flint flakes: 556. Potsherds: 504, 515–517, 520, 526, 528, 529 (clay spoon fragment), 538–539, and 548. Graphics: Lars Foged Thomsen.

Some hundred potsherds, two flint borers, a flint scraper, many hundred pieces of worked flint, a stone hammer and a tiny bead derive from the secondary fills above the sunken floor. A partly broken flint axe with typical (Late Neolithic) broad edge and a piece of a presumed loom weight also belong to these fills. From the sunken-floor horizon, in the northern part of the western section, a sub-circular area with a flint waste concentration possibly from producing or repairing scraper edges was investigated. Numerous flint scrapers were also concentrated in and about the same floor area. On the whole, therefore, a substantial number of artefacts belonged to the sunken-floor horizon.

Two patches (A and B) were excavated in the central part of the sunken floor. A few charred plant remains were found in the area of Patch A. In these patches, apart from some soil, a fair number of heat-affected/cracked stones were found; I have termed such areas "scorched-stone patches." The heat makes the stones fragile, resulting in the presence of many crumbled small stone pieces and even tiny grains of stone. Contrary to the deep "cooking pits" of somewhat later prehistoric periods in North Jutland, the use of these heated stones in sunken-floor Beaker houses took place at the level of the sunken-floor surfaces. In the sunken floor of House 122, the lowest part of the floor, which I have termed "low zone", was in the area of these two scorched-stone soil patches.

It is remarkable that not a single significant artefact, pit, or soil patch was left in the eastern portion of the sunken-floor area. In stark contrast to this, many artefacts were present in the western half of the sunken floor. The significant presence of objects that may relate to scraping activities including:

- Scrapers ranging from sizeable and very powerful to extraordinarily fine
- Scrapers having varying width and steepness of edges
- Several scraper edges severely damaged from use (bearing scars)
- A significant flint waste concentration (producing/repairing)
- Three flat stones (could have functioned as firm underlay for scraping processes)
- Three stone anvils (could have been relevant for hide-working processes) may back up the notion that comprehensive scraping activities took place here.

In my judgment, these artefacts and the presence of an unusually broad spectrum of flint scrapers represent the vestiges of a household with a highly-specialized workshop. These tools may well have been produced locally. Although I find it reasonable to suggest that the working of hides and skin was a major and specialized livelihood activity in this longhouse, treating bone or other firm, organic material cannot be immediately ruled out.[6]

The free space nearer to the central scraper area could, for instance, have been used to hold raw hides that were to be scraped. The massive scraping activities that are suggested to have taken place in the western area of the sunken floor beg the question as to whether some of the sizeable free space east of the two scorched-stone patches could have been used for the storage of finished products, i.e. heaps of ready-made hides, skins, etc. Concerning the treatment of hides, I propose that strong wooden posts, placed in two outdoor, stone-lined holes south of House 122, were used for stretching the hides.

6 Micro-wear analysis on a spoon-shaped flint scraper from a house at Resengaard shows that (although patinated) it is possible to identify polishing from scraping bone material (Skriver 2004; Simonsen 2017, 505). On initiative of the author, Claus Skriver (Moesgaard Museum, November 2018) made preparations for a micro-wear analysis of the 16 most complete scrapers from the sunken floor of House 122 at Hellegård, but scans showed that they were all too patinated, probably due to the chemical conditions of the soil.

Livelihood specialization in the Limfjord region

There are many Beaker settlements where we have indications or evidence that may point to specialized production, Glattrup IV and Hellegård were merely cases selected for more in-depth discussion. Moving from east to west across the Limfjord region, specialization has been argued to be present in numerous important Beaker settlements: flint mining at Bejsebakken/Skovbakken (Becker 1951; Vandkilde 1996; 2001; 2007; Apel 2001; Sarauw 2006; 2007 a; 2007 b; 2008; 2009; Simonsen 2017, 405p), flint dagger and flint axe production at Myrhøj (Jensen, J.A. 1973; Olausson 1997; 2000; Apel 2001; Vandkilde 2007: Simonsen 2017, 408p), extended cattle breeding at Rosgårde (Simonsen 2017; cf. Randsborg 1990; Kristensson, Olson & Welinder 1996. Rasmussen, M. 1999; Roymans 1999), beer brewing at Glattrup IV (Simonsen 2017; cf. Burgess & Shennan 1976, 309pp; Sherratt 1987, 96; Vander Linden 2001, 47; Sarauw 2008a, 87p), weaving/textile handling at Granlygård (Simonsen 2017, 397–399; cf. Jensen, J.A. 1973, 90; Hjärthner-Holdar 1977, 235pp; Jæger & Laursen 1983, 104; Sherratt 1982, 93p; 1987, 89; Jørgensen 1992, 114pp; Rindel 1993, 20p; Ebbesen 1995; Sarauw 2006, 35; 2007a, 29p); hide- and skin treatment at Hellegård (Simonsen 2017, 396; cf. Jensen, H.J. 2009, 215p), flint dagger production at Bjergene VI (Thorpe 2000, 75; Simonsen 2017, 400), and amber working at west coast settlements in Thy (Hirsch, K. & Liversage, D. 1987, 193pp; cf. Liversage & Robinson 1995; Simonsen 2017, 401).

I have worked out a "Model of three-level household production" (see Simonsen 2017, 393–408 for numerous references to the background knowledge). This hypothetical model of how production could have been practiced (distinguishing between A-, B-, and C-levels) aims to embrace what is common and what is specialized (Tab. 1). According to this model, at the A-level numerous ordinary subsistence activities would have been undertaken by all or most households; at the B-level relatively many households were involved in specialized production and services of one or more different kinds; and at the C-level relatively few households would have been involved in the making of certain products (and services). Most households would have been supplied with specialized products through exchange. Therefore, apart from providing an understanding of different levels of production, the main characteristic of the model is that highly varying kinds of specialized production contributed significantly to sustaining the economic aspects of life through exchange among households within and beyond the Limfjord region.

Whether a given specialized production was at an A-, B-, or C-level explicitly depends on an estimate of how many households were

Table 1. The "Model of three-level household production". During the early Late Neolithic, examples of B-level production could be the hide- and skin preparation and examples of C-level production could be the production of flint daggers of Type I C or the making of thin-walled, finely ornamented Beaker pottery. Scheme by the author.

C – level: specialization (Relatively few households involved)
B– level: specialization (Relatively many households involved)
A–level: basic subsistence activities (Most or all households involved)

considered to have been involved in producing the given commodities or services. I suggest that the broad spectrum of A-level production concerned more than 98 % of the households. Conversely, I suggest that C-level production related to less than 2 % of the households. It is more challenging to estimate the relative participation in the highly varied kinds of B-level production, but it seems plausible that this would range largely between 2 % and 10 % of households for many kinds of specialization. Some kinds of B-level specializations however, such as weaving, may well have been practiced by a significantly higher percentage of households.

It must be emphasized that I do not – a priori – consider these three levels of household production to represent a hierarchy of status as because they instead denote the relative number of households involved in a given kind of production or service. My idea as expressed in this "Model of three-level household production" does not therefore refer directly to the social standing of the households. For instance, households involved in more kinds of B-level production are not proposed to have been more important or to have achieved higher status than those with little or no such production. The relatively few households involved in a certain C-level production would not automatically have been assigned higher status, although it is obviously a possibility when related to commodities in great demand. An egalitarian ideology may well have prevailed in the Lim-fjord region at that specific time (Sarauw 2007a, 44; cf. Sarauw 2007b, 258; Simonsen 2017, 410pp).

Households may possibly have acquired some traditional "rights" to make certain B- and C-level products or services. In this regard, the model also includes the possibility that different kinds of work were exchanged, as in the completion of different practical services or performance of certain rituals.

Following this model, it would be quite wrong to consider the economies of the households as basically alike, with only moderate differences. The model instead offers room for significant differentiation between household economies due to, for instance, dissimilar kinds of specialized production or differences in skills. The possibilities and resources of the nearby landscape would likely often have been of great importance to the household economies.

The model is open to the possibility that not all households in the region necessarily made B- and C-level products or services. A few could probably have sustained themselves with A-level production. Conversely, households that did not carry out all A-level activities could also have existed. Un-related to the proportion of different levels of production in a household, further exceptions from A-level production might have related, in particular, to households consisting mainly of people suffering from illness, the disabled, the elderly or people otherwise indisposed and receiving their basic subsistence needs. and beyond from neighbouring households, close kin or other.

Likely, there would have been some competition in certain respects, but according to my model, cooperation among households may have taken place on a considerable scale. Some households may have worked together in the manufacture of certain commodities, or could have cooperated around B-and C-level services. Various members of a household might have worked at different levels and some household members might have produced at multiple levels.

It is a vital characteristic of the model that some kinds of specialized production (B- and C-levels) took place during certain seasons or shorter periods of the year when activities related to livestock keeping, agriculture, hunting, fishing, gathering, and other ordinary subsistence doings (A-level) did not preoccupy the residents too much. Specialized production could, in this way, have been highly compatible with tillage, animal husbandry, and other basic subsistence activities.

Over the centuries, frequent changes in the kinds of production carried out may have taken place. For example, the creation of pottery decorated in the fashion of the Maritime Beaker styles reached its peak early in the Late Neolithic, after which other styles became dominant. The onset of the pressure-flaking of flint daggers, which within South Scandinavia started in the Limfjord Region (e.g. Lomborg 1973; Vandkilde 2006; Apel 2001), quickly produced extremely high quality, new standard dagger forms that emerged throughout the Late Neolithic as the old forms went out of production. Households may have responded more or less swiftly to such new beginnings, declines, and alterations in production.

The "Model of three-level household production" is, of course, to be considered an abstraction. It is based on the idea that, besides the most basic activities, households also carried out various kinds of specialized production. An essential aspect of even specialized production is that it can be seen as a set of steps where at one end all or most households were involved whereas at the other, relatively few would have taken part.

Transforming settlements with sunken-floor houses over time

Sunken-floor buildings were also used as dwellings during the younger Single Grave Culture, (e.g. Hvass 1978, 219pp; Simonsen 1987, 141pp; 2006, 45p). In cases where two such buildings are found in a single site in the central Limfjord region, it is likely the structures succeeded each other (Tab. 2). From the following period, LN I, groups of up to three sunken-floor longhouses have been found in the central Limfjord region. In my understanding, the western ground-level-floor parts of these buildings (which seemingly first appeared in LN I) in many instances may well have been used for storing winter fodder (Simonsen 2017, 346). From the eastern Limfjord region, the exceptionally large Bejsebakken settlement contains numerous Beaker houses both with and without sunken floors that were occupied over several centuries (Sarauw 2006; 2008).

From the succeeding periods, LN II and the emerging Bronze Age, a total of 12 sunken-floor longhousessucceeding each other followed by 3 three-aisled longhouses solely with ground-level floors have been found on the upper part of the hill at Resengaard (Simonsen 2017, 37p). The increase in the number of houses grouped together, in my interpretation, points to gradually increasing settlement continuity in areas of the central Limfjord region. At Resengaard, residence thus relates to the use of the sunken-floor longhouses for a minimum of 300 years and thereafter presumably the use of the three-aisled longhouses for around 200 years (Simonsen 2017, 112p).

The increasing continuity may also be evidenced by the recovered sunken-floor houses at the quite extensive settlement at Trængsel (Loc. 98), situated in the westernmost area of the central Limfjord region (Mikkelsen 1995).

From the younger Single Grave Culture, the habitations were, in the known instances, a sunken-floor house of rather limited dimensions. To my knowledge no minor, presumably non-residential houses are evidenced at these locations in the central Limfjord region. From the LN I a minor, non-residential sunken-floor building likely belonging to House122 was uncovered at Hellegård and, at Granlygård, two minor houses and one short (less than 5 m long) sunken-floor house, all likely non-residential, were found. There are therefore more minor sunken-floor buildings for diverse other purposes already during the Beaker times. At Resengaard, 12 sunken-floor longhouses for residence, 13 minor houses (mostly non-residential), and one very short

Table 2. The table indicates possible evidence of gradually increasing settlement continuity during the younger Single Grave Culture, Late Neolithic I (Beaker settlements), and Late Neolithic II/emerging Bronze Age in the central Limfjord region, c. 2600–1600 cal BC. In addition, several presumed sunken-floor house sites have been observed at Tromgade and Trængsel. Table by the author.

Period	Location	Number of houses	Kind of building	Residence
Younger Single Grave Culture				
	Nr. Borris	1	Sunken-floor house	X
	Jebjerg	1	Sunken-floor house	X
	Jegstrup V	2	Sunken-floor house	X
	Strandet Hovedgaard	2	Sunken-floor house	X
Late Neolithic I (Beaker settlements)				
	Myrhøj	3	Two-aisled, sunken-floor longhouse, ground floor to the west	X
	Stendis	2	Two-aisled, sunken-floor longhouse, ground floor to the west	X
	Tastum I	1	Two-aisled, sunken-floor longhouse, likely ground floor to the west	X
	Glattrup I/III	2	Two-aisled, sunken-floor longhouse, ground floor to the west	X
	Marienlyst Strand	1	Two-aisled, sunken-floor longhouse, likely ground floor to the west	X
	Granlygård	2	Single-aisled, minor sunken-floor house	–
		1	Single-aisled, short sunken-floor house	–
	Hellegård	1	Two-aisled, sunken-floor longhouse, ground floor to the west	X
		1	Single-aisled, short sunken-floor house	–
	Glattrup IV	3	Two-aisled, sunken-floor longhouse, ground floor to the west	X
		2	Two-aisled, ground-floor longhouse	–
	Rosgårde	1	Two-aisled, sunken-floor longhouse, ground floor to the west	X
		1	Two-aisled, ground-floor longhouse	–
	Tromgade	3	Two-aisled, sunken-floor longhouse, likely ground floor to the west	X
Late Neolitic II/ emerging Bronze Age				
	Trængsel	3	Sunken-floor houses	–
	Resengaard	9	Two-aisled, sunken-floor longhouse, ground floor to the west	X
		3	Two-aisled, sunken-floor longhouse, likely ground floor to the west	X
		3	Single-aisled, minor sunken-floor house (with scorched-stone patches)	–
		10	Single-aisled, minor sunken-floor house	–
		1	Single-aisled, short sunken-floor house	–

house belonging to the LN II and emerging Bronze Age were discovered. Some minor and short houses were likely not found, as we generally left eight metres between the trial trenches. On average, therefore, there might well have been at least two smaller sunken-floor buildings per longhouse residence.

In summary, several contemporaneous building elements coexisted in areas of the central Limfjord region by the LN II/emerging Bronze Age. On average, each household may have had one longhouse residence and two or more smaller buildings, all with sunken floors, besides possibly other constructions without sunken floors.

It appears that some households used the longer buildings for non-habitation purposes for a significant period after ceasing to use them as places of residence (Fig. 8). Sections of sunken floors in some longhouses (Resengaard, Hellegård, & Tastum I) can substantiate that understanding.[7] Besides windblown sand layers of sand in these cases have been added on top of soil patches and (often uneven) floor areas, resulting in relatively level, new floor surfaces. These sandy "floor renewal layers", as I prefer to call them, must have been shielded by a roof as no traces of any vegetation horizons could be observed. With this new floor surface, the old building may from then on have been used for diverse purposes like keeping agricultural implements, tools, raw materials, specialized products, wooden centre posts that were going to be re-used, diverse timber and other wood for construction, as well as, for instance, for activities of chopping and stacking firewood.

After some period of time, depending also on when proper or adequate maintenance stopped, the old longhouse may have begun to deteriorate and collapse, and, as is clearly shown at House 2 in Resengaard (Simonsen 2017, 105), the building was set on fire after the removal of its centre posts (and likely other construction materials).

It seems that such post-residential use of longhouses is mostly ignored in literature on Neolithic buildings. According to my model of this use (Simonsen, 2017, 364pp), two sunken-floor longhouses would have simultaneously stood for longer periods; the new building serving as a residence and the old building for the above-mentioned purposes. It certainly seems most likely that the old longhouse would have functioned as residence until the new one was finished.

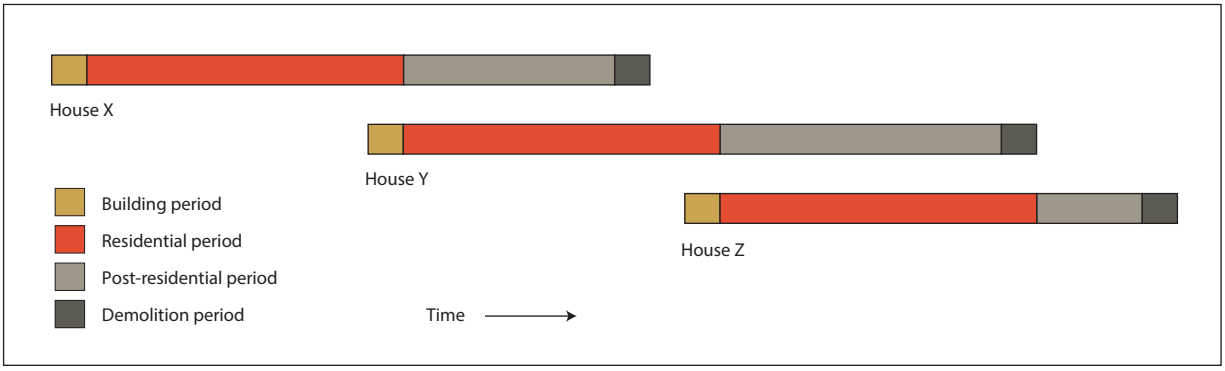

Fig. 8. Model of post-residential use of longhouses. Until the building process of a new longhouse had been completed, the old one remained inhabited. This is here illustrated with three hypothetical examples of longhouses with varying durations of after-residence life. It is even possible that the use of the longhouses after residence could have been longer than illustrated. Graphics: Lars Foged Thomsen.

7 Very often, details of post-residential use cannot be observed in sites of houses without sunken floors, whereas in those with sunken floors, stratified deposition in the sunken floor areas at some house sites provide the opportunity for unique observation. At Resengaard, some of the sections of sunken floors and the above soils in the hollow area would hardly make sense if not understood as including a post-residential use. Thus, in a longitudinal section of House 41, the presence of a (sandy) greyish-brown to blackish layer (Stratum 4, new floor surface) on top of a patch where heating formerly had taken place clearly illustrates that the heating function was no longer needed. The surface of this added layer was made very level (Simonsen 2017, Fig 4.68.E). In a longitudinal section of House 2 (site of fire) at Resengaard, the sandy, relatively sterile upper parts of a layer with dark-brownish soil (Stratum 4, new floor surface) were also placed on top of a patch where heating formerly had taken place (Simonsen 2017, 322 & Fig 4.68.C & Fig. 4.8.B). Similarly, at Hellegård, in House 122, an almost sterile layer of fine-grained, homogenous sand without natural stones and containing few artefacts (Stratum 4, new floor layer) was placed on top of a patch, where heating formerly had taken place (Simonsen 2017, Fig. 4.68.M). Likely, this layer had a wind-blown component. Even the cross section from the burned-down sunken-floor Beaker house at Tastum I (site of fire) can be understood in terms of corresponding formation processes. The sterile sandy layer (Stratum 4) over parts of the sunken floor was interpreted as a floor renewal layer (Simonsen 1983, 82). This layer was found beneath a blackish layer (stratum 3) from the burning of the house, and it can now be further interpreted as representing a period of after-residence use, where a layer of sand covered the floor and its former patches. Likely, this layer was added intentionally (but some deposition by wind cannot be excluded). Post-residential use of sunken-floor longhouses may have been systematic at many Beaker settlements in the central Limfjord region.

Was an extension of the length of settlement favourable for livelihood specialization?

A long trend of increasing settlement continuity from the younger Single Grave Culture to the Late Neolithic and the emerging Bronze Age (c. 2600–1600 cal BC) seems, in my reading, to be visible at a number of locations in the central Limfjord region.

Previously in this text, flint mining (Bejsebakken/Skovbakken), flint dagger and flint axe production (Myrhøj), extended cattle breeding (Rosgårde), beer brewing (Glattrup IV), weaving/textile handling (Granlygård), hide- and skin treatment (Hellegård), flint dagger production (Bjergene VI), and amber working (Thy, west coast settlements) were mentioned as concrete examples of specialization on Beaker settlements.

Remarkably, during this period it appears that we have actual locations where the same kind of specialization was continued for generations. As toat Hellegård, the excavation area was quite limited and we cannot therefore know whether other households in the vicinity of this house followed the same practise of specialized hide- and skin treatment. However, from the evidence of other concrete settlements, it can definitively be stated that some households appear to have developed ongoing traditions for certain kinds of specialization. At Myrhøj, the practice of specialized flint tool making thus appears to have been carried out in relation to all three longhouses which, in my view, likely succeeded each other (Simon-sen 2017, 362pp). At Glattrup IV, the tradition of specialization appears to have concerned the households of all three longhouses, which again probably succeeded each other. Strategies that were originally initiated by one household could thus, in some cases, have been continued as a tradition for more generations, though presumably with some adjustments such as the introduction of new methods and techniques of production. The stability of this livelihood specialization could be seen as a sign of correspondingly stable conditions for household exchange.

Building off of this background, I shall now turn to answering the central research question: whether influence from increasing specialization among households could have been of significance for the prolonged use of settlements in some areas of the central Limfjord region.

In terms of human behaviour, some factors might have existed that could have been barriers for longer residence whereas other factors could have worked directly as drivers for remaining in one place. Some barriers for longer residence at a Beaker settlement could well have related to agriculture and husbandry; I would in particular like to suggest a single factor, namely depletion of cultivable soil. It may, however, already in the LN I have been counteracted by some manuring.[8] Alternately, as concerns the Resengaard settlement (LN II/ emerging Bronze Age), it has been suggested that livestock were allowed to graze on former fields, thereby improving the soils (Simonsen 2017, 382pp). The apparent practice of particularly tillage in the areas of the former sunken floors (with thick soils) also would have helped to overcome this barrier.

In relation to increased specialization, several practical matters may have made it favorable to remain at a location for a longer period of time, i.e. sometimes over several generations:

Presence of resources: This may concern raw materials as well as natural "production" facilities in the immediate surroundings. By remaining longer at a location, households could both accumulate and pass down knowledge of their surrounding resources.

Amplified indoor space: The introduced non-sunken (western) parts of the longhouses may at times (when not used as storage

8 For a recent scientific study of manuring practice based on charred cereal samples deriving from numerous locations in Jutland see Kanstrup 2015.

facilities) have been available for indoor, space-consuming activities. Covered and shielded against weather impact, a post-residential use of existing old longhouses also may have represented a major advantage for different specialized activities as well as ordinary storage.

Cooperating households: Presence in the neighborhood of family relations, exchange partners, and cooperating households (which could together make specialized products or perform services).

The everyday life at the Beaker settlements with sunken-floor houses in North Jutland appears to have been well-organized. A varied range of household production with comprehensive specialization took place and, as argued above, aspects favouring longer residence at some locations may have held more weight than those driving a move. The coexistence of features like the presence of resources and cooperating households or options for more shielded indoor space may have led to prolonged residence at many locations.

Among the known find locations, the Bejsebakken settlement is, in my view, a relatively strong case where prolonged residence very likely was favoured due, not insubstantially, to the exploitation of the nearby flint mines (Becker 1993, 112; Sarauw 2007 b, 217–222).

To further substantiate this view, new investigations of sites with multiple dwellings would be of great interest. The excavation at the Glattrup IV settlement is completed and there are no possibilities for finding more Beaker house sites there. Conversely, as just a small area has been excavated at Hellegård, rich opportunities seem to exist for further investigations in this area.

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