Brændgaards Hede.
A settlement surrounded by pit zone fortifications from the early Pre-Roman Iron Age in Denmark

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Introduction

The Brændgaards Hede settlement site was discovered in the early spring of 2008. The site was previously known from Gudmund Hatt's registrations of ancient field systems. The new investigations have unveiled an early Pre-Roman settlement contemporary to the ancient field system. The settlement is quite extraordinary in Danish archaeological research, since all evidence points towards that the Brændgaards Hede settlement was fortified by means of a system of small open pits. In the last decade this kind of fortification has been found in increasing numbers. In most cases they are found with no connection to settlement whatsoever. The exact function of these so-called "hulbælter" or pit zone systems is still debated. The Brændgaards Hede excavation offers new perspectives to this discussion.

Brændgaards Hede

Brændgaards Hede is located near the village Torsted, 15 km northeast of Ringkøbing in Western Jutland, Denmark. The landscape of the western part of Jutland is characterised by eroded moraine formations from the Saale Ice Age, cut through by alluvial plains from the Weichsel Ice Age. The soil is generally sandy and quite poor. The areas best suited for human habitation and agriculture are normally found in connection to the meadows along the small rivers and streams that run to the fjords of the west coast. Brændgaards Hede is found near such a small river, Tim Å. The site is situated only 12 km from the important settlement site Grøntoft, investigated by Professor C.J. Becker in the 1960's and 1970's. The place name Brændgaards Hede means "the heath belonging to the farmstead named Brændgaard". Through history heather covered a large proportion of Jutland, namely the western part. Much of the heath land was created already in prehistoric times as a consequence of tree clearance, exhaustion of the soil and grazing. Until the late 19th century all attempts to cultivate the heather had largely failed. After the harmful defeat to Prussia in the war of 1864 a final and successful programme to transform the heath into productive arable land was launched.. This process continued up until the 1950ies and 1960ies, intensified by the introduction of motorised tractors in the post-war period.

At Brændgaards Hede a piece of heath land was still intact until the 1930ies when Professor Gudmund Hatt made his survey on ancient field systems ("Oldtidsagre") in Jutland, published in 1949. Together with Axel Steensberg, he mapped and directed a small investigation of a field system at Brændgaards Hede (Hatt 1949, 88). The field system consisted of long and slender field strips separated by low earthen balks acting as field boundaries. In 1934 the northwest part of the heath with the field system was already being transformed into farmland. Here on the newly ploughed surface Hatt found a thin cultural layer containing Iron Age ceramics, iron slags and worked stones. He also recorded a clay hearth, presumably a part of a house floor. He was not able to establish a chronological relation between the settlement and the field system, but he found it to be plausible.

In 2008 a forest plantation was projected at Brændgaards Hede close to the ancient field system. At that moment the entire ancient field system had been tilled for several years. According to aerial photography this began some time before 1954. In order to check if any archaeological remains would be harmed by the plantation project, the National Heritage Board granted limited funds to perform a trial excavation. The results of the test dig were somewhat disappointing in regards of the ancient field system. All traces of the balks had been erased by 50 years of farming. But one of the trenches showed some quite unexpected archaeological features: A vast number of closely spaced holes or pits. Soon it stood clear that the pits were part of a pit zone system similar to the one recognised at Grøntoft (Becker 1968; 1971). The exceptionality of the find taken into consideration, Ringkøbing-Skjern Museum decided to expand the trial excavation in order to investigate more of the pit zone system at the museum's own cost. The expanded trial excavation showed that the pit zone system was far more complex than any other known sites in Denmark. It consisted of not one but two parallel systems and had been rejuvenated in more instances. But an even bigger surprise was – as the excavation went along – that the pit systems surrounded a possibly contemporary settlement from the early Pre-Roman Iron Age in Denmark (roughly 500–250 BC). Therefore the decision was made to excavate the part of the site that was threatened by tree plantation. This was done in the spring of 2008. The following year a grant from the Archaeological Fund of HM Queen Margrethe II made it possible to follow the pit zone systems and the settlement further north in order to delimit the site. This took place in the winter 2009. One of the results of this campaign was the discovery that the pit systems truly enclosed the

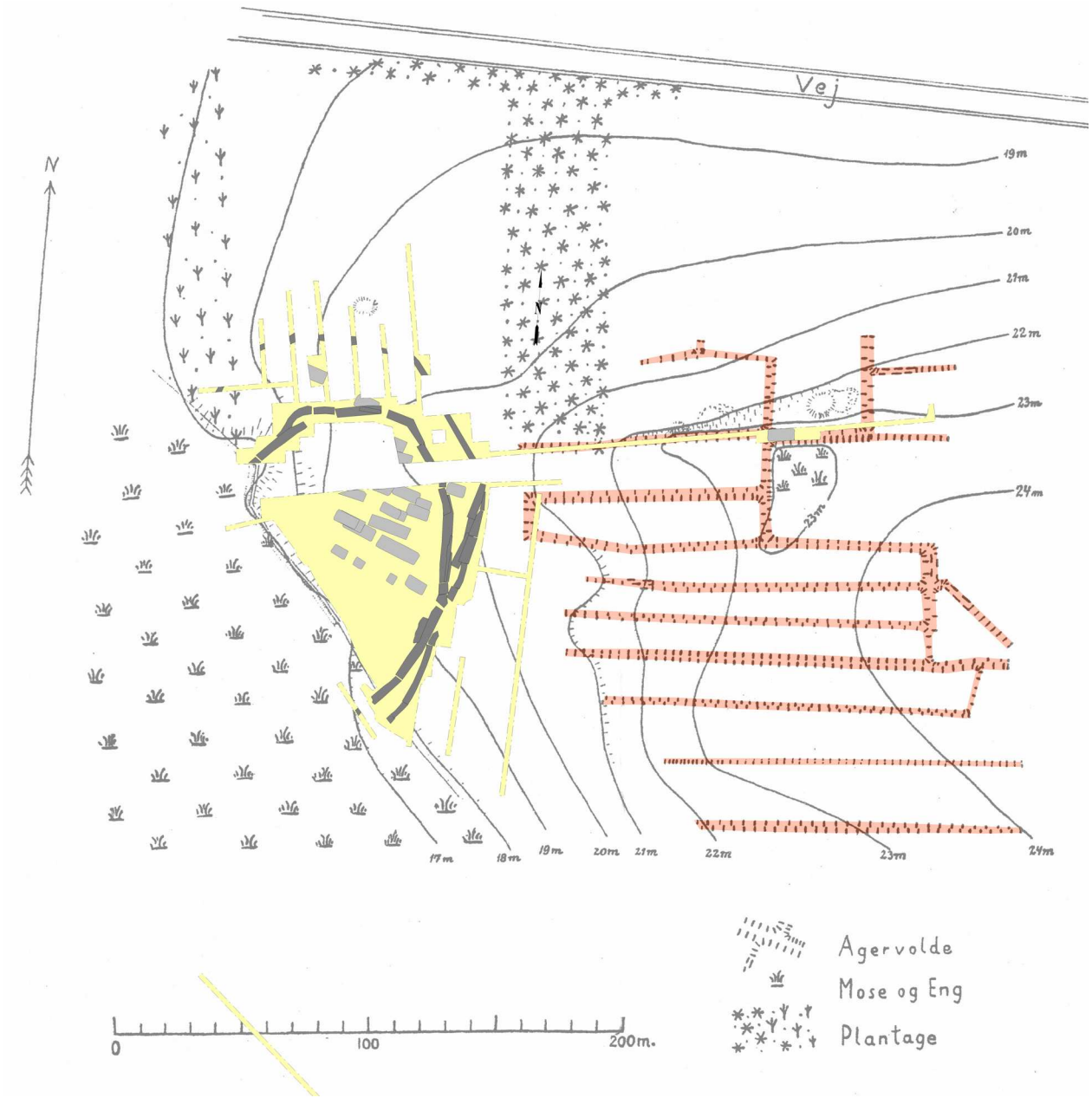

Fig. 1. The location of the excavated areas (yellow) with the houses (light grey) and the pits zone systems (dark grey) at Brændgaards Hede, in relation with the ancient field system (set off with orange) (after Hatt 1949, 87, fig. 87).

settlement. Another but less exciting realization was the site was severely threatened by the annual ploughing. On this background the National Heritage Board decided to finance a complete excavation of the remaining site. This final campaign will take place in the autumn of 2009. Hence the present text on Brændgaards Hede will only be an interim presentation of the site.

The pit zone systems at Brændgaards Hede

The Brændgaards Hede site is dominated by more than 4000 of small pits. The pits draw the shape of two overall systems, which will be referred to as the inner system and the outer system (Fig. 2).

The total length of the inner system is approximately 200 m. Possibly around 10–15 m still remain unexcavated. The stratigraphically documented initial phase of this system consists of six rows of pits. It starts out in the meadow to the south. From here it runs around the east side of settlement in a soft curve, with the exception of a single sharp corner in the northeast. After turning west it seems to end up in the meadow again and thus forming a semicircular enclosure. The construction of the system seems rather strict. Opposed to the later

Fig. 2. An overview of the pit zone systems at Brændgaards Hede during the 2008-campaign (Photo by the author 2008).

pit zone systems at Brændgaards Hede the oldest phase of the inner system has been made more or less without any sections division. In it's time of function a section has been attached to the north, probably on the purpose of expanding the enclosed area in that particular place. A group of not yet investigated adjacent postholes suggests that it might be related to the construction of a house close to the original pit zone system. In one instance a section has been attached to the inside of the original inner system. This section consists of rather small pits or holes dug close to each other in 5 rows. They could represent a minor enforcement of the main system. In addition to this it is clear at least in three areas that pit system sections have renewed the original pit system. These sections differ in various ways from the order of the original system. One section consists of a vast number of much smaller closely spaced pits. The lack of order is evident and the section can best be described as a "swarm" of pits rather than rows. But the original width of the system is still respected. Another later section is somewhat orderly made, but it only consists of 2–3 rows of small pits. The pits of the later sections all have been cut into the old pits which subsequently means that parts of the earlier system had been levelled. The question is whether the later sections represent a total but only partly preserved renewal of the pit system. Or if it they are mere maintenance in some sections of the original system? This is not completely clear but judging from the overall good state of preservation points towards renovation as a plausible explanation. Possible entrances were found in the inner pit system. At least one of them is a convincing genuine opening. It is situated close to the aforementioned corner in the northeast. It can be accepted as an entrance since the pits on both sides were rather well preserved. Being approximately 2,5 m wide it would thus be wide enough for a carriage. Another less convincing opening in the system is found to the southeast. Here the state of preservation is worse. Therefore it can not be ruled out that the opening is the result of modern ploughing rather than being a genuine entrance. Finally yet another opening in the inner should be mentioned. Furthest to the south on the brink of the meadow the inner system stops at a large 2,5 m wide pit. The length of the large pit remains unknown, but its absence in a trial trench dug in the meadow shows that it must be less than 6 m. The depth of the pit was approximately 90 cm and it contained a few pieces of early Pre-Roman pottery. This big pit could have acted as some sort of moat, replacing a part of the pit zone. But it did not mark the end of the pit zone system. In the trial trench in the meadow more pits were found. These pits must have been dug in a very dry summer or in water, since they were situated below ground water level (Fig. 3).

Fig. 3. A section of the pit zone systems at Brændgaards Hede, made clearly visible by rim (Photo by the author 2009).

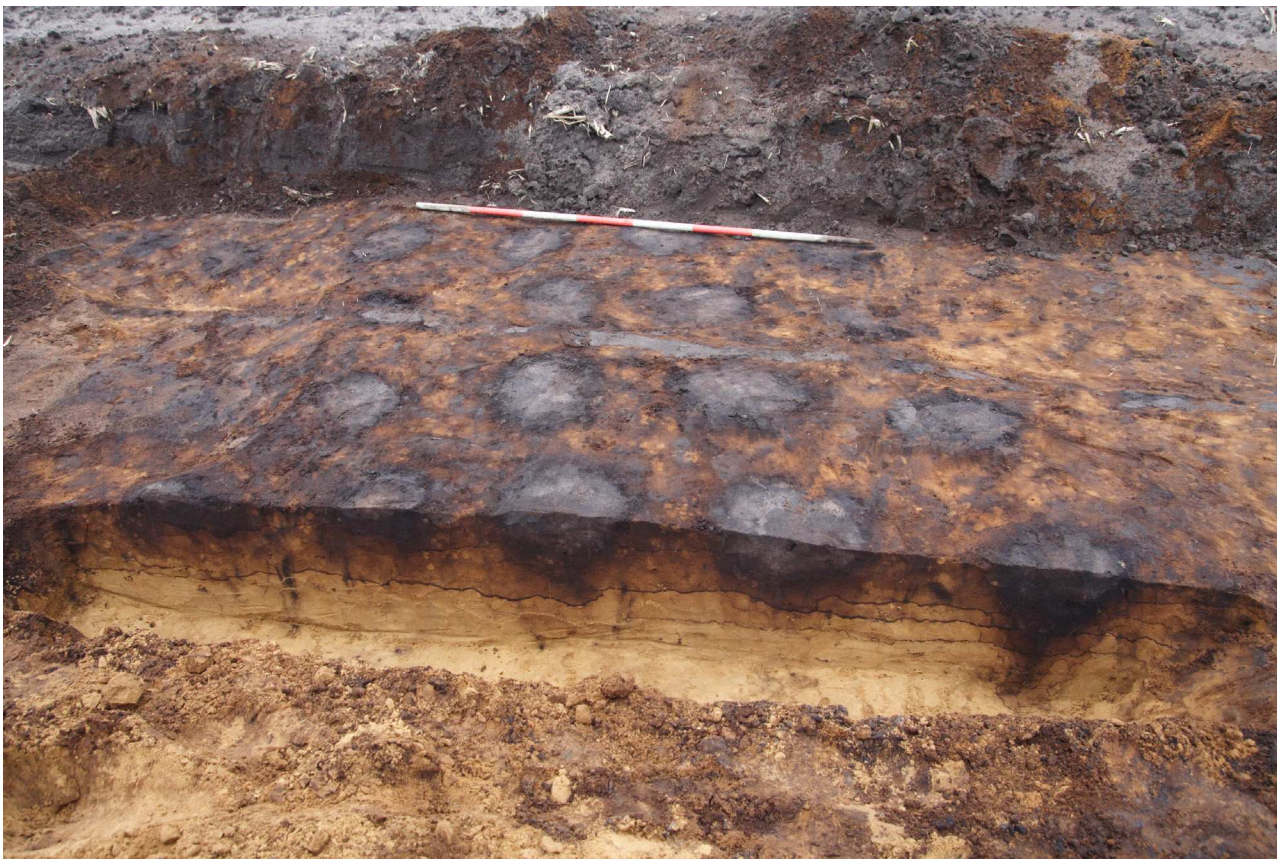

Fig. 4. A section of the outer pit zone system at Brændgaards Hede. Notice the hardpan precipitationd which have been left by the pits, which have been ploughed completely away (Photo by the author 2009).

The outer system has been documented over a stretch of 240 m in total at the moment. Future excavation may add up to 10–20 m more to length in the northern end, judging from the distance to the meadow. It surrounds the inner system with varied distances. To the south the outer system starts out approximately 7 meters to the east from the inner system. It gradually approaches the inner system as it moves to the north, and after 40 m the two systems border on each other. After another 20 m it moves away again with an increasing distance from the inner system. Further to the north it curves to the west and in the northern area we find the greatest distance between the systems of almost 30 m. Whether it meets the inner system again in the west end near the meadow is so far unclear, but likely the case. Because of conditions of preservation we have to distinguish between the northern and the southern part of the outer system. Whereas the southern field has been spared of intensified modern ploughing and was left unused over the last decade or so, the northern field has been intensively cultivated in the last few years by a new farmer. Added to this annual aeolian soil erosion has left only a thin top soil layer (20–25 cm) as protection against the plough. As a consequence the outer pit zone system the northern field has been completely removed and is only detectable through vague traces of podsolisation processes, where the pits used to be. Therefore it has not been possible to sort out any sections or phases in that part of the system. In the southern field it is quite clear that this system had been dug, extended and renewed at more than one occasion. In the very south it starts out in a fairly straight line consisting of 5–7 rows of small pits. Further to the north the picture is less clear. Here we find two individual sections, one overlapping the other. Both sections initially start out on the outer side of the oldest phase of the inner system. They both seem to respect the old system, which could indicate that old system was still in function when the outer system was made. How the exact extension and renewal took place in the outer system is quite puzzling since the sections seem to both overlap each other as well as being joined together. Nonetheless it is clear that the outer system, just as the inner system, had been maintained and extended on one or more occasions.

There is no solid evidence for the relative dating between the outer and the inner system. This owes to the lack of stratigrapic relation between the two systems. On the other hand the repeated bordering of the outer system on the inner system indicates that the latter was constructed first and later on the outer system was dug around it. Whether the outer system at some stage replaced the inner is hard to say for certain (Fig. 4).

Fig. 5. Presumed aeolian sand sediments found in the pit zone systems at Brændgaards Hede (Photo by the author 2008).

Fig. 6. Pointed oak stick found in situ between the pits in the meadow at Brændgaards Hede (Photo by the author 2008).

The characteristics of the pits themselves vary to a great extent, both within the single sections and the different phases. The diameters of the pits vary from 15–35 cm. In some extreme instances diameters have been found up to 50 cm. These large diameters are all found in the oldest phase of the inner system. The pits of the later phases and the outer system are generally smaller. The depth of the pits varies strongly too, with depths between 0–40 cm measured at subsoil level. As mentioned earlier some of the pits were virtually or completely ploughed away at the time of the excavation. They were only detectable owing to a podsol "shadow" or precipitation left in the subsoil (see Fig. 4). Their original depth must have been less than the present plough soil layer, i.e. 25–30 cm. The profile of the pits shows some variation, but they are in general cylindrical or pouch shaped. The fill of the pits presented different observations. A large proportion of the holes were filled with humic sand, i.e. old topsoil. On higher ground parts of the pit zone systems appear to have been filled with aeolian sand sediment. On the contrary the lowest lying pits close to the meadow were filled with peat. In several areas the pits displayed traces of podsolisation, appearing as a red brownish concrete like hardpan precipitation below the pits. During the first campaign of 2008 this hardpan was wrongly interpreted as part of the actual fill by the present author[1]. The podsolisation phenomenon was only found in the pits, not in the postholes related to the houses. The podsolisation, the peat and the aeolian sand fill are all indicators that the pits were left open and gradually filled by natural processes. But this question will be dealt with further down.

Only a few objects – mainly pottery – were found in the features of the pit zone systems. At lot of the sherds were quite small and fragmented. Other ceramics formed larger fragments of vessels that definitely represent primary depositions in the pits. In two instances massive depositions of ceramics were made in the pits. For the time being these ceramics haven't been put together yet, so it is hard to say if the vessel were complete functioning vessels at the time of deposition. The ceramics were found at the bottoms of the pits and must thus have been put there shortly after the time of construction of the pit zone systems. All the ceramic material from the pit zone systems are dated to the early Pre-Roman Iron Age, except a single sherd from the TRB (Jensen 2005). Apart from the ceramics a very important group of objects were found in the southernmost part of the inner pit system. This section of the pit system had been dug in the meadow, which flanked the western side of the Brændgaards Hede settlement. In spite of drainage and peat-cutting in historical times there still exist an anaerobe and wet environment just 30 cm below the present surface. These excellent conditions had preserved a number of five pointed sticks made of oak wood which were found positioned in the intervening spaces between the pits. The oak sticks found are 15–20 cm long and they are pointed in both ends. One end were used to fasten the sticks in to the subsoil, the other pointed upwards presumably acting as a passive weapon against unwanted trespassers. These

[1] The excavation of another pit zone system at Skraldhede later the same year, also directed by the present author, lead to the realization that the hardpan is a phenomenon created *under* the pits. Not in the actual fill.

Fig. 7. A section of the excavation at Brændgaards Hede showing house plans and the pit zone systems.

pointed oak sticks represent the only signs of constructions or activities related to the pits of the pit systems at Brændgaards Hede. No other traces of wooden posts or the likely have been found in the pits (Fig. 6).

The houses at Brændgaards Hede

At the present time one third of the expected settlement area within the pit zone systems remain unexcavated. Naturally this is a limitation when it comes to a detailed analysis on the settlement. Therefore only a general overview of the settlement structures will be presented here.

In total 22 house plans have been uncovered so far. Out of these only one house has been located outside the outer pit system, while two other houses are found in the open area between the two main pit systems. The remaining houses are found behind the inner pit zone system (Fig. 7).

The state of preservation is above average. Both house walls, byres and eroded manure passages have been preserved in a number of houses. 20 out 22 house plans have 2–4 sets of roof bearing posts with common total lengths between 4–12 m. 2 houses have 6 sets of roof bearing posts giving them a total length of 16,5 – 18 m. These houses are clearly above average for houses from the period (Rindel 1999, 92). They could be interpreted as indicators of a certain social status of some of the inhabitants of the Brændgaards Hede settlement. The exact number of contemporary houses at any given time is hard to discern owing to the lack of stratigraphical relations between most of the houses. A guess would be that 2–3 farms consisting of 1–2 buildings existed at the same the same time through the occupation period of Brændgaards Hede. But this picture might change when the rest of the settlement will be excavated (Fig. 8).

A remarkable detail is the strong consistency in the orientations of all the 21 houses within the inner system. The orientation is best described as “sun-right”, that is an east-west orientation with a slight tilt to the south. The only house that differs from this pattern is the one house situated to far to the east outside of both pit zone systems. This house has also an approximate east-west orientation, but opposed the remaining houses it shows a slight tilt to the north[2]. However it shares the exact same orientation as the ancient field system recorded by Gudmund Hatt. One of the field boundaries are situated in the immediate proximity of this house, and it is therefore likely that the balk determined the orientation of the house, which as a consequence means that the settlement and the field system must have existed at the same time. Another indicator of correspondence between the three elements of field system, pit zone system and settlement, is that

[2] The typological determination of this house is not 100% certain, but it is definitely a pre-roman house.

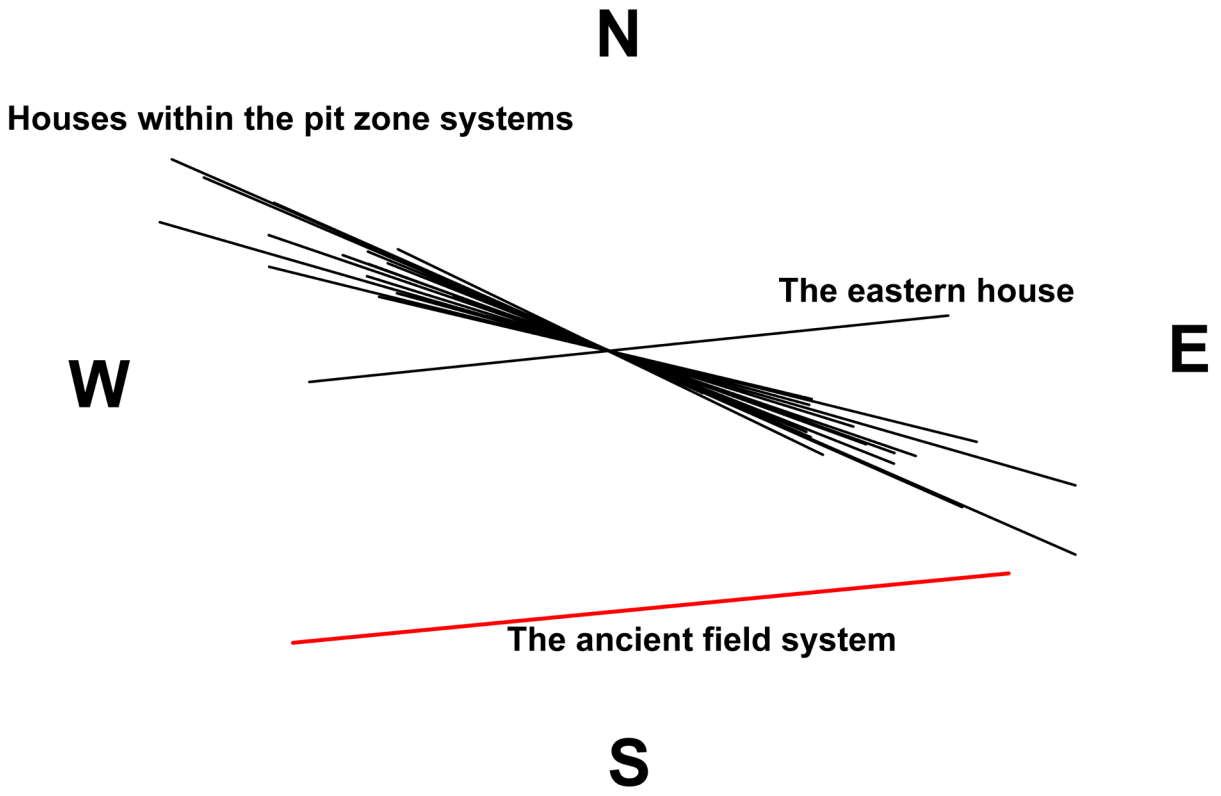

Fig. 8. A diagram showing the orientations of the houses at Brændgaards Hede found within the pit zones systems compared to the eastern house, yet again compared with the average orientation of the ancient field system.

plough marks were only found outside the outer pit zone system in the area of Hatt's field system. Marks made by ard found in the east west orientated trial trench were – not surprisingly – parallel plough marks which followed the orientation of the elongated field strips recorded by Hatt. Close to the front of the outer pit zone system the parallel ploughing made a clear turn, thus underlining the observations on the extent of the cultivated area made in 1934.

An important question regarding the settlement at Brændgaards Hede is at which stage the pit zone systems were laid out. Was it planned from the beginning or was it added later? Since the houses and the pits so consequently respect each other, only few indicators suggests at which stage of the settlement the pit zone system was added. Out of the 22 house known at the moment, only one house is in direct conflict with the pit zones. This particular house is found stratigraphically under the inner pit system in the northern part of the site. Quite fortunately, as described above, the inner pit zone represents the first phase of all the systems. The house in question has got a rounded western gable and two sets of roof bearing post holes and it clearly belongs to the Pre-Roman house type Ia known from Grøntoft (Rindel 2001). It represents the earliest group of houses at Brændgaards Hede, and thus it gives the inner pit zone system a terminus post quem date to the 5th century BC. One of the roof bearing posts of the house were cut by a pit of the inner system. In this exact pit a large fragment of a small ceramic vessel was found. According to the chronological studies made by C.K. Jensen this vessel dates to his Pre Roman Iron Age period I it can't be any later than 200 BC. (Jensen 2005, 162, 174). Hence the construction of the inner pit zone system can be narrowed down to somewhere in the period of 500–200 BC, which corresponds to the durance of the settlement.

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Summing up on the present knowledge on the Brændgaards Hede site, the following can be stated: The settlement was founded around 500 BC in the earliest Pre-Roman Iron Age. Around the beginning of the late Pre-Roman the settlement seems to have been deserted. The settlement can fairly be connected to the earlier recorded ancient field system situated immediately to the west of the settlement. After at least one phase of occupation a semicircular system of rows of pits were dug around the settlement with ends ending in a meadow on the west flank of the settlement, forming a sort of enclosure with at least one entrance. Later this inner pits system was renewed on one or more occasions and an outer pit system was dug around it. This pit system too was maintained for a period. The pits seem to have been

Fig. 9. An example of the well preserved longhouses with byres and manure passage found at Brændgaards Hede (Photo by the author 2008).

left open and gradually filled by natural processes. In the lowest lying part of the inner pit system anaerobe conditions showed that pointed oaks sticks had been put in the ground between the pits.

In this way the Brændgaards Hede settlement represent so far a unique situation in the Danish archaeological material. In no other case such a clear association between a settlement, its field system and surrounding pit zone has been documented. In order to fully comprehend some of the implications of this extraordinary archaeological situation, it is necessary to interpret it in a wider context. In the following section the significant and still peculiar pit zone systems will be investigated in detail.

Other pit zone systems in Denmark

When dealing with the settlement archaeology of the Pre-Roman Iron Age the Grøntoft site is for certain one of the most well-known and important sites from the Pre-Roman Iron Age in Denmark for a number of reasons (Becker 1968; 1971, Rindel 1999). However a slightly overlooked aspect is the rather impressive pit system, which was found there. Maybe the admittedly strange character of this first found pit zone system at Grøntoft was the reason why its significance was somewhat neglected by its excavator, Professor C. J. Becker. And maybe for the same reasons it did not make the due impact on the Danish archaeological research it obviously deserved. In 1976 a second pit system was found at Engedal near Viborg, but this system was almost forgotten too, over-shadowed by the exceptional find of a TRB cult house from the same site (Faber 1977). The pit system from Engedal remains unpublished. The major breakthrough for the acknowledgement of the pit systems came with the partial excavation and publication of Lystbækgård in 2001. For the first time a serious effort was made to explain the function of the pit systems. Owing to an increase in archaeological excavation activity a still growing number of known pit zone systems has literally boomed over the last decade. To this date (June 2009) 18 pit systems have been found, almost exclusively in central and western Jutland. In the following a short overview of the so far published pit systems in Denmark will be given in addition with the unpublished pit zone system at Skraldhede, which was investigated by the present author in 2008.

Grøntoft

The Grøntoft site is situated on a relatively high ground in the centre a moraine hill island in Western Jutland. Apart from 10 Bronze Age houses more than 250 houses dating from the Pre Roman Iron Age period I & II, 500–150 BC (Becker 1968; 1971, Rindel 1999). The excavated houses have had a major impact on settlement archaeology in Denmark especially on the question of the birth of the nucleated settlement around 250 BC (Rindel 1999).

The pit zone system at Grøntoft consists of three separate sections. Although it can't be ruled out that these excavated fragments of the pit system represents two or more individual systems, the overall impression is that they form a large combined system. The system seems to have enclosed a large proportion of the area, which settled through the early Pre-Roman Iron Age. But it is impossible to connect the system with a certain phase of the settlement. The system is single phased and doesn't show any signs of maintenance. The only exception is an attached sub-enclosure in the northern part of the site, which may represent a later addition similar to the extension found at Brændgaards Hede as described above. The pit system is approximately 3m wide and the pits have an average depth of 30 cm. The diameter varies from 15–35 cm (Becker 1971, 90). The pits are aligned in 5–7 rows. The date of the pit zone system is based on two observations. To the southwest the system runs through a tumuli cemetery. At grave number 112 the pit system cuts the foot of its tumuli. In order not to disturb the central grave the makers of the pit zone system made a slight change in direction. As a consequence the system must have been laid out sometime after the construction tumuli grave, which belongs to the early Pre Roman Iron Age (Becker 1968, 254). The other important observation was that two period I houses superimposed the pit system (Becker 1971, 91). In combination these observations fixes the date of the Grøntoft pit zone system to the early Pre-Roman period (Becker's per. I).

Lystbækgård

Lystbækgård is situated only 5 kilometres north of Brændgaards Hede. The system was only partially excavated in 2000 (Rindel/Eriksen 2001). Through trial trenches and small excavated surfaces almost 200 m of a single phased pit system has been unveiled. The width of the system is around 3,5 m and it consists of 7–9 rows of pits. The main proportion of excavated part of the system has a distinct "L-shape" with a rather sharp corner. A single trial trench on the other side of the modern road showed that the system probably forms an enclosure. Therefore future investigations could prove it to be a parallel to Brændgaards Hede. However no clear proof of a settlement has been found yet. The investigation in 2000 yielded some interesting observations regarding to the fill of the pits. Some of the Lystbækgård pits were clearly filled with aeolian sand sediments. Other pits seemed have contained standing water through some period. The creation of this fill is possible since the location is suffering from a high ground water level resulting seasonal flooding of parts of the site. Finally the Lystbækgård pits showed clear traces of podsolisation processes like the ones found at Brændgaards Hede. Here too the positions of some of the pits were only detectable through the precipitation shadow left in the subsoil. The pits themselves had been completely ploughed away. Yet again some of the Lystbækgård pits were well preserved under layers of aeolian sand. Here the depths the pits were measured to depths of 20 cm, and the fill could be recognised as homogenous humic soil, with no traces of posts or the likely. Held together with the level of ancient plough marks superposing the original depth of the pits must be 30–40 cm (Rindel/Eriksen 2001, 17). The Lystbækgård pit system was dated by the find of a single ceramic vessel deposited in a pit. The ceramic piece dates to approximately 400 BC (Rindel/Eriksen 2001, 18).

Rammedige

A unique archaeological situation is found at Rammedige in Northwest Jutland (Olesen 2003). Rammedige is a defensive structure consisting a north-south oriented linear rampart and with a moat to the east of it. The total length of the rampart is estimated to have been 2–2,5 km long (Olesen 2003, 28). The rampart is preserved in a height of 2 m and 7 m wide. The moat is equally 7 m wide and 2 m deep. Unfortunately so far no datable material has been recovered from the Rammedige rampart. But other similar ramparts from Denmark have been dated to the Roman Iron Age. What make Rammedige extraordinary are the results of an excavation of a small area in front of the moat in 2001 and 2002. Quite surprisingly an 80 m long section of a pit system was found, running parallel less than 2 m from the front of the moat. The system consisted of up till 7 rows of closely spaced pits placed in a 3,5 m wide zone. The pit zone was nearly linear but with a somewhat wavy course. The pits themselves were in a bad state of preservation and could only be detected as pricipitation below their former positions.

So far Rammedige is the only known example of a pit system found in connection with a moat and rampart. But it raises some questions. The dated pit systems all belong to the early Pre Roman Iron Age. On the other hand all the dated ramparts belong to the Roman Iron Age. So if the pits and the rampart are contemporary, this could indicate that the use of pit systems in the Roman Iron Age too. If it is the other way round, then the use ramparts could be traced back to the Pre Roman Iron Age. A third possibili-

ty could be that the two elements of fortification are not at all contemporary. In that case the rampart could be a refurbishment of a much older territorial border that had existed – and had been defended – already in the early Iron Age. But this is so far speculation.

Risum Østergård

The Risum Østergård pit zone system was investigated in 2004 (Steen 2005). The site is situated 7 km east of the city of Holstebro where it runs across the main road to the city of Viborg. In total 237 m of the pit system has been uncovered. The system is more or less linear, 3 m wide and it consists of 5–7 rows of pits. The system seems to be connected to a ravine, and thus extending a natural barrier. In this way it has made it possible to control the east-west transport corridor, where we still find the main road between Holstebro and Viborg (Steen 2005). This road or corridor has been used since prehistoric times, which is demonstrated by the line of Neolithic and Bronze Age burial mounds placed along it (Olesen/Skov 1989).

B. Steen has convincingly demonstrated that the pit system was constructed in labour divided sections with individual lengths of approximately 3,5 meters. On the west side of the pit system a system of double-paired postholes for every 4 meters were found. The distance from the pit system is approximately 2 m. As B. Steen states the character of the posthole pairs are somewhat contrasting to the pits of the main system. They are up to 50 cm deep and cylindrical in profile, just as regular postholes know from house structures. On the contrary the fill of the pit zone system pits are vaguer in colour. According to B. Steen they have an average depth of 15 cm (2005:15). In the opinion of the present author the fill of the pits in the main system could maybe be interpreted in another way. From what is presented it seems that the pits have been ploughed away, and that all what is left, is the spots of hardpan precipitations in the position where the pits used to be. Whether or not this holds true, the difference between the pit zone and the double-paired posthole system, demonstrated by B. Steen, underlines the fundamental difference between pit zone pits and double-paired postholes. No datable archaeological material has been recovered from the pit system, but it is expected to be of the same date as the Grøntoft system, i.e. the early Pre Roman Iron Age (Steen 2005, 21).

Tvis Møllevej

Only 5 kilometres to the west of Risum Østergård another impressive pit zone system has been investigated, also by B. Steen (2009). The site is called Tvis Møllevej and the pit zone system is running across the very same main road as the Risum Østergård system in a straight line. Tvis Møllevej has been documented over a stretch of 908 m of which 757 m has been excavated. To the south it is cut of by the modern water power reservoir, but one may assume it ended in the now flooded meadows along the small river Storåen. The northern end has not been traced yet.

The pit zone system virtually forms a straight line through the terrain. It is 4 m wide and consists of 9 rows of pits. I some areas 8 or 10 rows are found. In opposition to Risum Østergård there is no trace of a parallel row of post holes along the pit zone at Tvis Møllevej. It is estimated that approximately 16.000 pits were dug in the known 908 m of the system (Steen 2009, 5). The pits measure 25–30 cm in diameter and they are 15–30 cm deep. Whether these measurements represents the actual dug depths or if they could in fact represent the downward extent of a podsolisation process underneath the pits, is slightly unclear. In the opinion of the present author the cross section photo published (B. Steen 2009, fig. 8) shows that the pits seemingly have been ploughed away and that the dark fill with its bleached core and the surrounding ochre coloured soil could be the results of a strong podsolisation process underneath them. No datable material has been found in connection with the pit zone system of Tvis Møllevej.

Skraldhede

One of the latest finds of pit systems was made at Skraldhede. In relation to road making along the main road between the cities of Ringkøbing and Herning a 37,5 m long section of a pit system was found divided in two separate excavation fields. In opposition to most other pit systems known the pits of the Skraldhede system was dug in a rather slovenly manner, so it doesn't make much sense to talk of "rows" in this particular case. The width of the pit zone is also a bit uneven with measures of 3 to 4,8 m. What really make the site extraordinary are the pits themselves. The pits found at Skraldhede are in an extremely good state of preservation. The reason is that the area has never been subjected to modern ploughing. The area used to be heath land until it was turned in to a plantation by hand in the late 19th century.

In the surface at subsoil level the pits demonstrated distinct character: The centre of the features consisted of a dark peat like fill, which is the typical topsoil created on heat land, called mor or raw humus. Around the actual pit there was a halo of white bleached sand. Further around there was another halo of hard ochre brown hardpan. The subsoil in which the pits were dug was pure sand, but surprisingly hard as concrete. When shovelled it broke into horizontal layers, which probably is the result of the

Fig. 10. The pit zone system found at Skraldhede. Notice the significant halos of bleached sand and hardpan surrounding the actual pits (Photo by the author 2008).

so-called fragipan phenomenon, created during the permafrost of the last Ice Age (Dalsgaard 1998, 8).

The profile of the pits showed that they had been dug in a cylindrical shape. The diameter varied between 15–20 cm and they were 20–25 cm deep, measured at subsoil level. The topsoil layer was 25 cm thick, so the original depth of the pits is estimated to approximately 45–55 cm. The fill of the pits was strongly stratified, and consisted of changing thin horizons of sand and of dark layers of mor. In the top of several pits this obviously gradual fill stopped at some stage, and the uppermost fill consisted solely of mor. Around the sides of the profile and especially underneath the pit there was strong layer of bleached sand, which was again followed by a hardpan. This is a typical sign of the already mentioned podsolisation. Only in one instance the hardpan was almost absent. In this particular case a large fragment of a vessel had been carefully deposited so that it covered the sides and the bottom of the pit. The explanation for this is likely that the ceramic prevented acid rain water from sieving down in the subsoil through the pit, and thus hindering the podsolisation process. Unfortunately the vessel had been refurbished from a larger broken vessel, which had removed the otherwise datable rim. But it seems to be of Iron Age character.

From the small excavated area it is so far hard to say whether Skraldhede were a linear system such as Risum Østergård, Tvis Møllevej and the majority of the unpublished systems, or if it forms an enclosure as seen at Grøntoft, Lystbækgård and Brændgaards Hede. However judging from the location, it is most likely to be a linear system. It is situated across a natural forced corridor of transportation at a narrow place. If the course of the excavated pit zone is prolonged in both directions it will supposedly get in contact with wetlands to north and the south. If this holds true, the maximum length of the Skraldhede system is approximately 900 m.

After this short run-through of the published pit zone systems in Denmark some common traits can be stated. The unpublished pit systems familiar to the present author doesn't change the general picture considerably, but underlines the common traits presented here. First of all, all pit zone systems known, except one site from Lolland (Sakshøj), has been found in either Central or West Jutland. Their construction is very homogenous with the small pits aligned in 5–9 rows in a 3–5 m wide zone. Some pit zones have a system of posthole pairs along one side others doesn't. Finally one system has been found in connection with a rampart and moat (Rammedige).

From the outlines of the pit zone systems two groups can be distinguished. On one hand we have the linear systems that are laid out in an almost perfect straight line through the landscape with no regards the terrain whatsoever. Examples of this are Risum Østergård and Tvis Møllevej, and this is the main group of pit zone systems. On the other hand we have systems that curves or turns in sharp angles and forms an enclosure. Two out of the three known enclosure-like pit zone systems (Grøntoft and Brændgaards Hede) have been found in connection with settlements of the early Pre-Roman Iron Age. It is likely that further excavation at the third site (Lystbækgård) will present similar settlement structures. No linear system has been associated to any contemporary settlements. The strong relation to natural forced transport corridors and watersheds suggest that the linear systems were placed on topographically strategic places rather than on sites suited for settlement. None of the linear pit zone systems have been dated, but their strong structural correspondence with the dated enclosure-like systems suggests a chronological relation. When it comes to the pits, there is some variation in sizes and depths. No traces of wooden posts have been recorded in the pits, except the postholes found along the linear pit zone at Risum Østergård. The only "constructions" ever recorded in direct relation with the pits are the pointed oak sticks from Brændgaards Hede. A predominant common feature of most of the pit zone systems is the hardpan precipitations

Fig. 11. A section of one of the pits of the Skraldhede system. Notice the significant halos of bleached sand and hardpan surrounding the actual pit, which has been gradually filled with layers of sand and mor (Photo by the author 2008).

below the pits. This geological process must be related to the function of the pits.

As already mentioned the pit zone systems are almost exclusively found in Central and Western Jutland. The only author who has addressed this peculiar distribution is B. Steen. He has presented an interesting map of the pit zone systems in relation to the distribution of heath land in the late 18th century (Steen 2009, fig. 10). This map shows that pit zone systems are situated in an area of Jutland with a historical high density of heath land. Heath land used to cover almost the entire western half of the Juttish peninsula from the south to the north. B. Steen doesn't explain the proposed relation between heath-dominated areas and the distribution of pit zone systems in detail, but merely states that there must be an underlying connection (B. Steen 2009, 10). His suggestion seems plausible but requires further discussion. A number of the pit zone system have in fact been found on 18th century heath land, including for instance Brændgaards Hede and Skraldhede, which is indicated by the place names. But on the other hand some of the unpublished pit zone systems have been found on old arable land, such as Nøvling and Gammelbosig near Herning. Another immediate problem is that a lot of heath land existed in Northern and Southern Jutland too, but so far only one pit zone systems have been found there (Borregård 3). These arguments could be problematic towards a *direct* causal explanation between the late 18th century distribution of heath land and the locations of the known pit zone systems. That the majority of the pit systems are found on old heath land is not nescessary significant, since most of Southern, Northern and Western Jutland was covered by heather. The risk of circular reasoning is imminent.

Therefore in order to accept the proposed heath land relation we need to substantiate the supposition in another way. In this respect it might be worthwhile to take a closer look at the hardpan precipitations of the pits. As mentioned earlier a reasonable proportion of the pit systems have been ploughed completely away. The only reason why they are still detectable is that podsolisation processes left distinct marks in the subsoil. If it wasn't for the precipitations, pit zone systems such as Rammedige, Risum Østergård, Tvis Møllegård and parts of the Brændgaards Hede systems would maybe never have been found.

This is an important recognition, since the podsolisation processes are a regional phenomenon in Denmark, mainly found in the very same areas as the aforementioned heath dominated areas in the18th century. Of course this is no

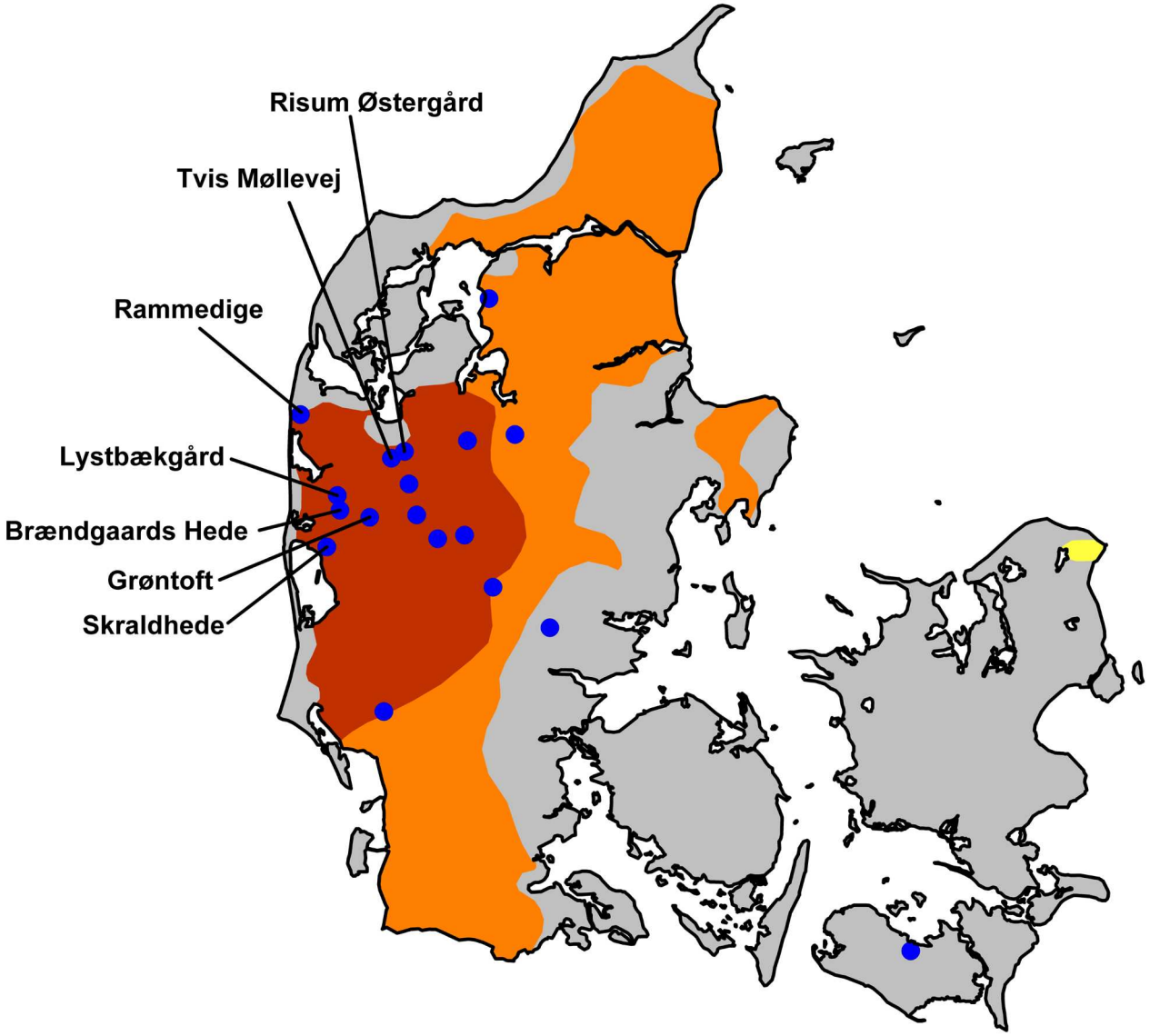

Fig. 12. A map showing the 18 known pit zone systems in Denmark (blue dot) in relation to the podsol soil distribution (after Bornebusch/Milthers 1935). The signatures are: Light podsolisation (yellow), medium podsolisation (orange) and strong podsolisation (dark orange).

coincidence. Two things are fundamentally important for the podsolisation. First the rainfall must exceed the water evaporation from the surface. Secondly the soils must be a poor starting-point for the topsoil, such as sandy soils (Dalsgaard 1998, 6). Acid rainwater leaching down through the layer will dissolve minerals from the topsoil which will precipitate further down in an oxide hardpan. Plants such as heather will intensify this process, due to chemical compounds in its leaves. And since heather is a hardy plant which can survive on even the poorest soil, this leads to a vicious circle. This is the reason why we find a correspondence between the distribution of heath land and podsol soils. But the degree of podsolisation within this heath dominated region varies as presented by Bornebusch/Milthers (1935). Rather remarkably the area with the highest degree of podsolisation is identical to the area with the highest density of known pit zone systems. Hence the argument stated here is that the main factor for the distribution of the pit zone systems first and foremost owes to the degree of podsolisation in the subsoil. The stronger the podsolisation, the greater is the chance of detecting a pit zone system, even though they have been ploughed away in most cases. As a logical consequence there is no reason believe that pit zone systems were not used in Eastern Denmark in the Pre-Roman Iron Age. The prerequisite of good conditions of preservation are just far higher in this region, since we can't rely on the telltale precipitations here.

The function of the pit systems

The complex pit zone systems found at Brændgaards Hede and other sites must have served an important purpose, not at least when taking the great effort that was spend in their construction. But what could that purpose be? Did the thousands of individual features function as either open pits or as postholes? In the case of the latter, what did the postholes support? The interpretational discussion of the function of the pit zone systems is – just as the archaeological material itself – a rather new and open discussion with no general consensus yet[3].

The presented arguments can be divided in two groups: Scholars who believe that the pits held some sort of construction, and scholars who suggest that the pits were left open. A general conception is that that the pit zones are defensive structures, but they have been regarded as mere territorial markers or fences as well. The earliest interpretation presented is that of C.J Becker, published in relation to the find at Grøntoft (1968, 251). In Becker's opinion the vast number of features had to be postholes of either massive palisade or alternatively a sturdy fence. Unfortunately he doesn't give any explanation of how this rather unusual proposed palisade or fence would have been constructed with the 5 to 7 rows of postholes. Nor does he present any archaeological observations to support his hypothesis. The impression left is that Becker indeed was very uncomprehending towards the nature this first found pit zone system.

The interpretation made by Becker was left unchallenged until 2001 when P.O. Rindel and P. Eriksen published their excavations at the pit zone system found at Lystbækgård. As earlier described in this text the excavators didn't find any signs of posts in the features of the system, such as Becker had imagined. On the contrary aeolian sand sediments and traces of standing water in the pits indicated to the excavators, that the pits had been left open. Furthermore P. O. Rindel and P. Eriksen raised doubt towards the possibilities of erecting massive timber constructions in the treeless Pre-Roman landscape of West Jutland, such as Becker imagined (2001, 19). This lead to the introduction of a rather divergent hypothesis based on a description made by Julius Caesar in his in Bellum Gallicum. In a passage dealing with the siege of Alesia the year 52 BC, Caesar describes how the Roman soldiers used a fortification called "lilies" which were a system of 3 feet deep pits dug in eight rows with a distance of 3 feet from each other. Covered by twigs and branches, a pointed stakes was places in each pit (Rindel/Eriksen 2001, 19). Apart from the obvious differences in dimensions and date, the authors found it likely that the pit zone systems from Denmark shared the principle concept as Caesar's "lilies". Maybe covered with grass and heather the pits could have formed an unpleasant obstacle for an attacking band of warriors, constructed as an ad-hoc fortification, constructed as a response to a specific threat. Whether or not the Danish pit zone systems contained pointed stakes, has been left as an open question (Rindel/Eriksen 2001, 20).

In the publication of Risum Østergård a third interpretation was presented by B. Steen (2005). B. Steen found it likely that the pit zone systems functioned as lines of closely erected pointed posts. In this way the pit zone systems function as a wooden version of the Chevaux-de-Frise fortifications known from Bronze Age and Iron Age hill forts in the Atlantic region. His interpretation has been repeated in the publication of Tvis Møllevej (Steen 2009).

Finally in an article on the fortifications of the Pre-Roman Iron Age in low-land Northern Europe and Scandinavia, J. Martens has addressed all the hitherto presented interpretations of the pit zone systems. In opposition to Becker, Rindel, Eriksen and Steen, J. Martens doesn't conceive the pit zone systems as fortifications in a military sense. He has doubts whether a pit zone system like Grøntoft could have been manned sufficiently. Otherwise they would have acted as a mere delaying obstacle or they could be turned against their enemies, he states (Martens 2007, 96). To illustrate his doubt J. Martens uses the war booty find from the Hjortspring bog as an indication of army sizes in the Pre-Roman Iron Age, which is apparently about 100 warriors. In comparison Martens estimate that an average village of the period would have 70–100 inhabitants, which would be able to raise 15–25 men at arms. Due to this disproportion the pit zone systems are unlikely to have served as fortifications in his opinion. Instead Martens offers a "not quite so intriguing interpretation" which is that the pit zone system are the traces of a primitive fence, possibly of brush wood, whose purpose was to keep the animals of the village in or out (Martens 2007, 96).

As an off set to evaluate these diverging opinions towards the function of the pit zone systems it is now the time to return to the recovered evidence from the Brændgaards Hede site. It is the viewpoint of the present author that the answers to archaeological questions should be sought in tangible archaeological data material, rather than assumptions. As described earlier a range of different observations was documented in relation to features of the complex pit zone systems at Brændgaards Hede. One of them was that aeolian sand sediments had filled the pits in certain areas of the pit zones. As already stated by Rindel/Eriksen the obvious consequence must be that the pits were left open and filled by air blown sand. If individuals had filled them, the fill should have been similar to what we find in the postholes of the house constructions, i.e. a mixture of sand and topsoil. To fill the pits with sand from a nearby sand dune would

[3] The generel impression of the author on basis of the seminar *Cæsars Liljer og jyske hulbælter*, held at Ringkøbing-Skjern Museum, 2. of February 2009.

make little sense, especially if one would want to support a post or larger pointed stakes. If the windblown sand sediments had filled a cavity left by a removed post, one would expect to find a profile section with a sandy core surrounded by a humic sand fill. This is not the case at Brændgaards Hede, and therefore it supports the observations made at Lystbækgård. Another strong characteristic of the pits at Brændgaards Hede is the strong podsolisation around and underneath the pits. As already explained the precipitation must be the result of a increased leaching of rainwater and illuviation as a consequence. Again, this is something specific to the pit zone systems, not normal postholes. Finally, at Brændgaards Hede peat had filled pits in the low lying southern part of the inner pit zone system. This suggests two possible explanations. Either the pits were dug through a peat layer that subsequently was put back in the hole. Or the peat was gradually created in open pits. Either way the soft peat is useless in regards of supporting a post or the likely. In the opinion of the present author all these observations, combined with the results from Lystbækgård, adds up to the argument that the pits were left open and filled gradually by natural causes. In addition we have the negative argument that not a single trace of a post has been presented from any the published pit zone systems. This is striking, bearing in mind the tens-of-thousands of pits that have been uncovered collectively already. This fact is equally problematic to the interpretations presented by C. J. Becker, B. Steen and J. Martens respectively.

So the pits were left open – but does this immediately make them fortifications in a military sense? J. Martens has suggested that the pit zone systems acted as symbolic territorial border, maybe with additional purpose of keeping cattle in or out. As described this is mainly because he believes that a single village couldn't withstand an army of 100 warriors. First of all, ethnographical studies show that one should expect violent conflicts in all scales in pre-state societies (Helbling 2006, 114). To employ a single war booty find as Hjortspring as a measure of the sizes of conflicts in the Pre-Roman Iron Age is maybe to overstretch the material. Furthermore to argue that pit zone system didn't function against a 100 man band of warriors is really not an argument. All fortifications will break if the power of the enemy is sufficiently great. Once again the only proper thing to do is to look at the evidence. First of all we have the observations from Rammedige. Here we find a pit zone system in relation with a generally excepted fortification in a militaristic sense, a linear moat and rampart. Even if the pit zone system should turn out to be a predecessor to the moat and rampart, the close physical relation between the three elements suggests that we are dealing with the same concept, a fortified border. Another maybe stronger argument for a militaristic interpretation of the pit zone systems is the newly found pointed oak sticks, which were preserved in the low wetlands area of the Brændgaards Hede pit zone system. Pointed oak sticks like these have previously been found at two other sites, Lyngsmose and Borremose (Rindel/Eriksen 2001, Brøndsted 1960). These sites happen to be the only two fortified settlements known from the Pre-Roman Iron Age in Denmark. At Lyngsmose the pointed oak sticks were found stuck in the bottom a water filled moat surrounding the settlements. It is hard to imagine that the Iron Age farmer at Brændgaards Hede was so eager to keep his cattle inside or outside of the settlement that he wanted harm their hoofs with pointed sticks. Finally we have the historical analogies, of which Bellum Gallicum already has been mentioned. In addition to this, one will find descriptions of so called "military pits" in manuals on field engineering dating as late as to the 19th century. And example is the field engineering captain J. S. Macaulay, who informs that small pits of 2–2½ feet's depth are a *"good obstacle"* if placed in 2–3 rows and with short pointed stakes or pickets positioned in the pits and the intervening spaces. And he adds that small branches may be laid over the pits so that the enemy may not be able to distinguish and leap over them (Macaulay 1834, 80–81).

In other words, all the archaeological and historical evidence supports the ideas originally presented by Eriksen and Rindel. The Brændgaards Hede refines their image of pit zone systems by showing that pointed sticks were in fact used – seemingly not in the pits – but on the surface between the pits. In this way the pit zone systems functioned as a passive mobility restraining obstacle, in order to slow down and break up an enemy attack. The ideas of wooden posts, large pointed stakes or any other solid construction in pit zones seem unlikely on basis of the present archaeological evidence.

What remains is to explain on what background the pit zones systems were introduced. And equally important, why the concept was was abandoned again. These are some of the tough questions that need to be answered in future. As a starting point some provisional ideas will be discussed here. It seems reasonable to believe that any sort of fortification, at any time, will reflect the threat they were raised against. An important observation in this regard is the short-lived use of the pit systems in Danish prehistory, which we must assume on basis of the present evidence. Probably the pit zone systems – as a stand-alone fortification – only made sense in a very specific military context of the Pre-Roman Iron Age. Our only chance to grasp the nature of the military context of the period on a regional level is to take a closer look at the few war booty sacrifices from the period, with the Hjortspring and Krogsbølle finds as the most informative (Rosenberg 1937, Kjær 1901). In these deposits we find some clues to the weapon system of the Pre-Roman warrior. Compared to the war booty finds from the Roman Iron Age, the Pre-Roman weapons depositions display some significant differences. One of interest in this connection is the apparently complete absence of

distance weapons in the find complexes, i.e. bow and arrow. In Hjortspring the find material comprises of a boat, 169 lance heads of iron and bone, 11 swords, and 64 wooden shields. But not a single arrowhead, arrow shaft or bow was found. This picture is repeated in the second largest Pre-Roman weapons sacrifice from Krogsbølle on Funen. Here too no traces of bow and arrow were found. As a consequence it seems reasonable to suggest that the use of bow and arrow wasn't a part of the game on the Pre-Roman battlefield. This notable circumstance has lead to the suggestion that some sort of conventions of war might have existed in that period (Randsborg 1995). No matter what the lack of distance weapons offers a reasonable explanation to the question why the pit zone systems seems exclusive to the Pre-Roman Iron Age. Whereas the pits acted as an obvious obstacle for an advancing attacker in a close combat situation, the fortification was of limited use, if its defenders were showered in arrows from a distance. Only when a safe cover was applied behind the lines of pits, the system could be manned during a missile attack. This could indeed be the purpose of the double-paired alignment of post found at Risum Østergård. At Rammedige the problem is obviously solved by a rampart and a possible palisade on top of it.

The implications of the Brændgaards Hede investigation

The unique character of the Brændgaards Hede site sheds new light on the earliest Pre-Roman Iron Age. Combined with the other newfound pit zone systems the site sheds new light on at least two important perspectives of the period. However it is beyond the scope of this article to investigate them in further detail, and thus they are just presented as inspiration for future research. One perspective is the tangible archaeological proof of violent conflicts and warfare in the early Pre-Roman societies, which lead to the creation of defended territorial borders and fortified settlements.

As mentioned Brændgaards Hede is a unique find for time being. But when one takes the extraordinary conditions of preservation of this particular site in to consideration, there is every reason to believe, that this kind of fortified settlement could have been much more abundant in the Pre-Roman Iron Age, than the case at the moment. The same goes for the linear pit zone systems, which have grown considerately in number in the last decade. These observations draw the emerging picture of a society in constant immediate threat of armed conflicts. With the investigation of Brændgaards Hede we can say, that the repeated rejuvenation and expansion of the inner and outer pit systems was not the result of a single incident, but a maintained fortification in use over a period of time. We still need to know if this was the case with some of the linear systems too. Another important aspect of Brændgaards Hede is the grouping of a small number of farmsteads behind a common "enclosure", in this case a pit zone system. With some caution it seems fair to say, that Brændgaards Hede is the earliest known example of the nucleated village in Danish prehistory. More than one factor probably may have lead to the transition from dispersed single farms to common fenced villages around 250 BC. But as Brændgaards Hede demonstrates, the need of shared protection must have been an important one of them.

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