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EDITORIAL

Editorial

The year 2017 has been an interesting and instructive year not least for the two new members of the editorial group Mette Svart Kristiansen, Aarhus University, and Rune Iversen, University of Copenhagen, who both joined *Danish Journal of Archaeology* (*DJA*) in December 2016. It is an intriguing task to facilitate the publication of so much good, diversified, and solid research. As new members of the editorial group, we are impressed by the general high quality of the submitted manuscripts. Additional to their quality, the manuscripts show rich diversity of subject areas spanning cross-disciplinary areas such as ancient DNA studies, isotopic analyses, osteology, macrofossil analyses, and of course solid archaeological subjects including chronology, typology, excavation methodology, and theory. Chronologically, volume 6(1+2) spans a lengthy period from the early Mesolithic through the Bronze Age, Iron Age, Viking Age, and to the early Middle Ages.

The format has slightly changed, as we have extended the word limits for research articles to 8000 words. At the same time, we would like to encourage brief communications as well and to let *DJA* facilitate prompt online dissemination of exciting news from excavations, museum collections, and archives, as well as ongoing methodological and theoretical debates or new discoveries to our international readers. It is our ambition the journal reflects the ongoing and diverse archaeological research in Scandinavia, and we therefore welcome contributions on new discoveries from all periods, from the early Palaeolithic to present-day society.

An essential part of the editorial work is to find the perfect reviewers for the incoming manuscripts. This is not always an easy task, in particular not if manuscripts include a variety of disciplines. However, we have experienced willingness, helpfulness, and high standards from all of our anonymous reviewers for which we are very delighted. As new members of the editorial team, we would also like to thank the people at Taylor & Francis Group for their support and guidance on the more technical matters of the peer-review and manuscript managing process.

Fortunately, the total number of full-text downloads keeps rising, and in 2016 we surpassed more than 13,000 downloads, thus more than doubling the amount compared to 2015. For the first three quarters of 2017, we are at 8500, which is also very promising, and we surely hope to continue on these positive notes and perhaps again improve the scope of our outreach for the coming volumes.

Law and Archaeology

As a new initiative, we have arranged our issue 2 of vol. 6 as a *Special Issue*, which focuses on the different interrelationships between the history of law and archaeology. The background for this particular Special Issue was the international conference *Law and Archaeology in the Early and High Middle Ages, AD 400–1200*, which took place at the Carlsberg Academy in Copenhagen 7–8 December 2010. The conference was organised as a co-operation between the National Museum, Moesgaard Museum and the Law Faculty at the University of Copenhagen by Prof. Lars Jørgensen and the Associate Professors Helle Vogt and Mads Kähler-Holst. The Carlsberg Foundation and the involved institutions funded the conference. The purpose with the conference was to bring archeologist and legal historians together in order to illuminate the 'legal mentality' of the period AD 400–1200. The hope was to development new questions and new approaches to both the archaeological material and the written culture and thereby generate new answers and interpretations of the inheritance and kinship structures behind family burial patterns, the marking of property and related transactions, the control of natural resources, etc.

Already during the conference itself, it became clear that the many important questions and examples presented would be interesting to introduce to a

broader audience as well as to provide the authors with the opportunity to present more pervasive analyses. Therefore, a publication of the individual presentations was agreed upon. Conference proceedings work in mysterious ways and via the attentive eyes of Lars Jørgensen, the coupling with *DJA* was established in 2016, and Helle Vogt was instated as guest editor. The result is a Special Issue with six contributions from four different countries covering as diverse subjects matters as óðal and runestones, Carolingian *pfalzen*, watermills, Norwegian commons lands or manor houses, as well as private property in medieval Denmark.

As of now, there are no plans for making the Special Issues a recurring feature in every volume, but rather an editorial enterprise to be put together when the opportunity arises. This also entails that should you have any suggestion for a theme, we would very much like to hear from you, and as is the case with *Law and Archaeology* and Helle Vogt, the possibility of acting as guest editor is certainly open.

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RESEARCH ARTICLE

Iron and Viking Age grapes from Denmark – vine seeds found at the royal complexes by Lake Tissø

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ABSTRACT

Since the mid 1990s the National Museum of Denmark and Museum Vestsjælland have conducted excavations on two royal residential complexes from late Germanic Iron Age and Viking Age. During the excavations a range of samples were collected for macrofossil analysis. In two of these samples two seeds of vine grapes dated to the late Germanic Iron Age and the Viking Age were discovered. So far they are the oldest grape seeds discovered in the present Danish area.

One of the seeds was chosen for strontium isotope analysis in order to determine the provenance of the grape. The strontium isotopic composition of the grape seed yielded a $^{87}Sr/^{86}Sr$ ratio of 0.71091 (±0.00004; 2σ) which falls within Denmark's strontium isotopic baseline range indicating that the seed could be of local origin.

Archaeological and historical evidence seem to point to that people in the Iron and Viking Age knew and consumed wine and even had access to gain potential know-how related to wine production. Hence, even though it is not possible to determine whether the two seeds found at Tissø are a result of either grape consumption (fresh or dried) or used for wine production, these finds point to that grapes and probably wine were products consumed by the elite at Tissø.

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KEYWORDS
Iron Age; Viking Age; Tissø; grapes; wine; agriculture; strontium isotope analysis

Introduction and archaeological background

Since the mid 1990s the National Museum of Denmark and Museum Vestsjælland have conducted excavations on one of the richest Northern European sites from late Germanic Iron Age and Viking Age. The site is located on the western bank of the Lake Tissø, Western Zealand (Figure 1) (see, e.g. Jørgensen 1998, 2009, 2013, 2014). During the excavations, the site has revealed the remains of two royal residential complexes (*c.* 500–1050 CE) and a wealth of other features like assembly sites, market and craft areas and a range of ritual sites (Figure 2) (e.g. Jørgensen 2014, Jørgensen *et al.* 2014). The first estate was located at Bulbrogård (*c.* 550–700 CE) and when this site was abandoned a succeeding estate was established *c.* 600 m to the south at Fugledegård (*c.* 700–1050 CE) (Bican 2010, Jørgensen 2014). In connection with some of the investigations in recent years, in particular the excavation campaigns in 2012–13,[1] a range of samples were collected for macrofossil analysis. It was in two of these samples that the remains of vine grapes were found and so far they are the oldest grape seeds discovered in the present Danish area.[2] Due to the uniqueness of the find an archaeobotanical analysis was conducted together with a strontium isotope analysis. In the following the results of these two analyses will be presented followed by a discussion of the possible archaeological context in which we can place the grape seeds. The latter is done in order to get a sense of how and for what purposes the grapes ended up at a royal settlement complex on Western Zealand.

The find circumstances

In connection with the investigations of the first residence at Bulbrogård in 2012–13 a range of pit houses were excavated. Most of them were quite damaged of ploughing through the years, and therefore only the bottom layers were preserved. However, one pit house, BU-A2308 differed from the others given that the house had two layers

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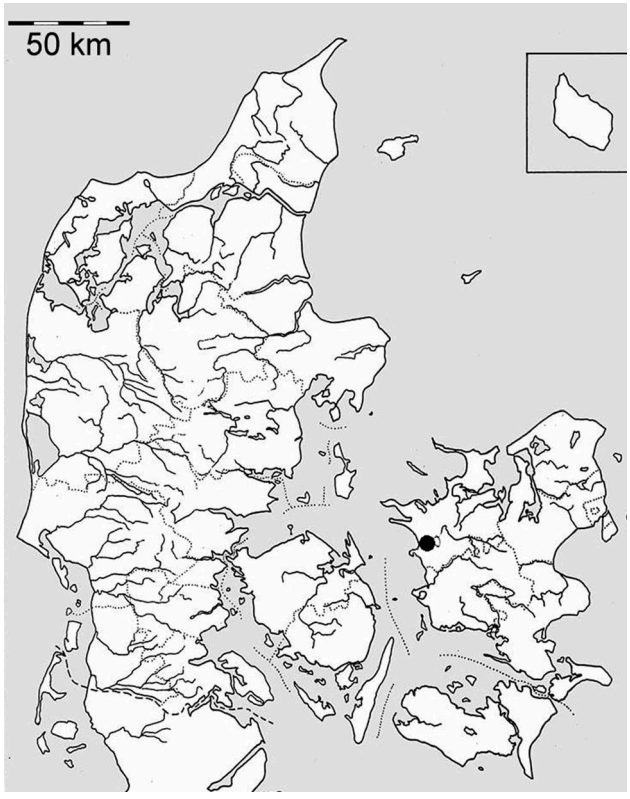

Figure 1. Location of the Tissø complex in Western Zealand, Denmark.

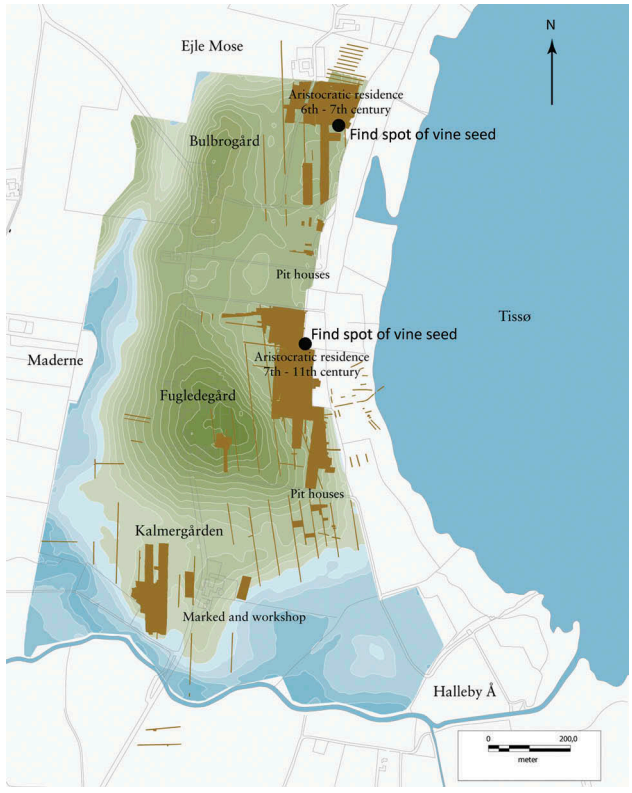

Figure 2. Excavation plan of the Tissø complex with the finds of grape seeds marked. Map by Bican, J.F., Brejnholt, P. & Jørgensen, M.N., National Museum of Denmark.

preserved, whereby it became possible to extract stratified samples. Yet, there was no clear differentiation in the samples and they all contained typical settlement refuse consisting of a small amount of carbonised seeds of hulled six-rowed barley, oats, bread wheat and field weeds. Although all samples were more or less similar, one sample from the bottom part of the filling material of the pit house differed from the rest as a carbonised seed of common grape vine (Vitis vinifera) was found.

At the complex situated at Fugledegård, excavations carried out in 2013 were conducted in what is considered to be the blacksmith area connected to the residential area. Here a smaller area containing an intact cultural layer FG-A108 dated to the Viking Age was investigated. Under the excavations a range of samples were collected for macrofossil analysis. The samples were gathered from different levels of the culture layer and in five different square metres. The main content in these samples was typical household refuse such as grains and a very small amount of seeds from ruderal plants and field weeds. However, as was the case with the pit house at Bulbrogård, one sample from the culture layer, contained a carbonised seed from common grape vine. The samples, furthermore, contained remains from collected berries and nuts such as shells from hazel (Corylus avellana) and seeds from sloe (Prunus spinosa) and elder (Sambucus nigra).

The grape seeds

The grape seeds had been preserved by charring before deposition in the refuse layers. The two seeds were 4.0–4.3 mm long and 3.1–3.6 mm wide (Figure 3). This is rather small compared with modern grape seeds but comparable with the seeds from a contemporary find from Gotland/Sweden (Hjelmqvist 1993) (Figure 3). Furthermore, the carbonisation may also have reduced the size as modern tests have shown that grape seed shrinks 8–13% during charring (Smith and Jones 1990). The grapes could be from either of the two subspecies, wild grape vine (Vitis vinifera ssp. sylvestris) or cultivated grape vine (Vitis vinifera ssp. vinifera). Stummer (1911) has on the basis of 1200 measurements of seeds from the two subspecies concluded that the

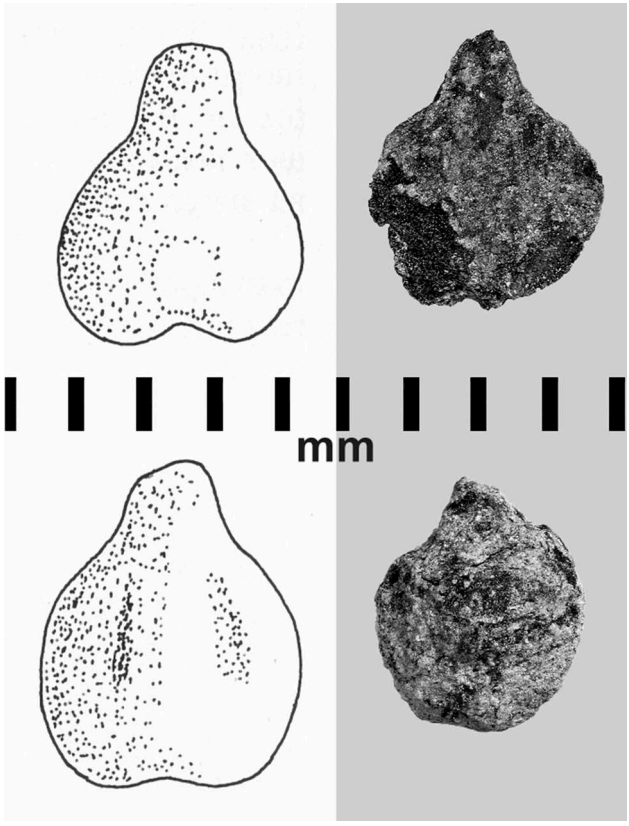

Figure 3. The two grape seeds from Tissø to the right, to the left the two grape seeds from Gotland (Hjelmqvist 1993). Photos: John Lee, National Museum of Denmark.

breath/length ratio for wild grape seeds lies between 54 and 83 and the same ratio of cultivated grape seeds lies between 44 and 75. The two grape seeds from Tissø have a breath/length ratio of 77 and 84 placing them in the sylvestris type, but according to Smith and Jones (1990) the ratio can increase during charring. This makes an identification to subspecies level on the basis of the breath/length ratio, uncertain when it comes to single seeds of a species with such a high variability, as also described by Schiemann (1953, p. 319).

Seeds from wild grape can also be identified on the basis of the surface pattern with a ridge on one of the sides (Stummer 1911) but the seeds from Tissø were too damaged to be identified by this character as the surfaces patterns could not be seen.

Janushevich and Nikolaenko (1979, p. 124) describe finds from Krim of grape seeds that could represent a hybrid between the wild and the cultivated grape. These finds are dated to the period contemporary with the Danish Pre-Roman and Roman Iron Age. The two seeds from Tissø resemble these hybrids as do the seeds from Gotland (Hjelmqvist 1993). However, a certain determination of the Tissø seeds to the exact type is unfortunately not possible.

Datings of the grape seeds

In order to be certain that the grape seeds are not modern seeds that have entered the prehistoric features, one of the seeds was C14 dated. The other seed was kept for strontium isotope analysis. The dated seed came from the cultural layer and was dated to the Viking Age between 780 and 980 CE (UBA-29010) (Figure 4).

A twig from the bottom layer of the pit house where the other grape seed was found was dated to the late Germanic Iron Age (UBA-29006) (cf. Figure 4) indicating that this grape seed was 100–200 years older than the seed from the cultural layer.

Strontium isotope analysis

A grape seed that weighed 4.4 mg was chosen for strontium isotope analysis in order to determine the provenance of the grape. A previous pilot study by Heier *et al.* (2009) showed that strontium isotope analyses of archaeological carbonised grains from calcareous soils (similar to the soils found in Denmark) can be used to investigate the provenance of cremated plant remains. Heier *et al.* (2009) pre-cleaning procedure consisted of a hydrochloric acid (HCl) leaching step. In our present study we have added yet another step to ensure the removal of other non-carbonate contaminant dust particles such as silicates. This step consists of an extra 20% hydrofluoric acid (HF) leaching step that effectively removes solid microparticles (Frei *et al.* 2009, 2015). Subsequently the seed was washed ultrasonically in ultrapure (MilliQ™) water.

The seed was introduced into a pre-cleaned 7-ml Teflon beaker (Savillex™) and thereafter dissolved in a 1:1 mixture of nitric acid (HNO_3) and hydrogen peroxide (H_2O_2) (Seastar). The solution was dried down overnight on a hotplate at 80°C.

The sample was taken up in a few drops of 3N HNO_3 and then loaded on a decomposable extraction column with a 0.2-ml stem volume charged with intensively pre-cleaned mesh 50–100 SrSpec™

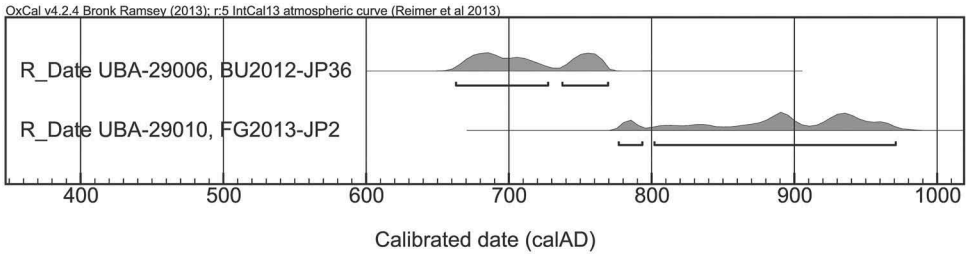

Figure 4. AMS radiocarbon dates of a twig from Bulbrogård (top) and a grape seed from Fugledegård (bottom) calibrated with OxCal v4.2.3 (Bronk Ramsey 2013) and IntCal13 (Reimer *et al.* 2013).

(Eichrome Inc.) resin. The elution recipe essentially followed that by Horwitz *et al.* (1992), scaled to our needs. Sr was eluted/stripped by pure deionised water and then the eluate was dried on a hotplate.

The strontium sample was dissolved in 2.5 µl of a Ta_2O_5–H_3PO_4–HF activator solution and directly loaded onto previously outgassed 99.98% single rhenium filament. The samples were measured at 1250–1300°C in dynamic multi-collection mode on a VG Sector 54 IT mass spectrometer equipped with eight faraday detectors (Institute of Geoscience and Natural Resources Management, University of Copenhagen). Five nanogram loads of the NBS 987 Sr standard gave $^{87}Sr/^{86}Sr$ 0.710236 (+/- 0.000010). Error is reported in Table 1 which is within-run (2 σ_m) precision of the individual run.

The results of the strontium isotope analysis of the cremated grape seed are presented in Table 1. The result revealed that the seed has a strontium isotopic composition of $^{87}Sr/^{86}Sr$ 0.71091. Previous studies delineating the range of bioavailable strontium isotope compositions characteristic for Denmark (excluding the island of Bornholm in the Baltic sea, and hereafter referred as Denmark) – also called baseline – have resulted in a baseline range defined by $^{87}Sr/^{86}Sr$ values of 0.708–0.711 (Frei and Frei 2011, Frei and Price 2012). Consequently, as the strontium isotopic composition of the grape seed falls within Denmark's strontium isotopic baseline range it indicates that the seed is probably of local origin. However, the strontium isotope results could also match other parts of Europe with similar isotopic compositions of bioavailable strontium. Such areas include Northern Germany, some areas in Britain (Evans *et al.* 2010) or even far more long distant areas, that have long been known for their wine production such as Northern Italy, where modern prosecco vineyards have recently yielded a range a strontium isotopic range of 87Sr/86Sr between 0.70706 and 0.71215 Italy (Petrini *et al.* 2015).

Archaeological and historical evidence of the use of grapes

We do not know what the Tissø grapes presented above were used for, but obviously the find of grapes at the royal residences generates new archaeological perspectives which deserve some attention. In the following different sources will be discussed in order to try to contextualise the vine grapes, which could be of local provenance and not imported (cf. above). At present there are two scenarios in which we can choose to see the grapes: I: the fruits of the vine plant were consumed raw or dried, as either fresh grapes or raisins, II: the grapes were used to produce beverages (probably alcoholic drinks) such as wine. However, before discussing these scenarios in more detail the archaeobotanical evidence of prehistoric grapes and a rough outline of archaeological objects connected to wine will be presented. In this respect we will start by investigating if vine could be cultivated within Southern Scandinavia in prehistoric Iron and Viking Age.

Vine cultivation; the climatic conditions

Studies of different proxies such as tree rings, pollen, oxygen isotope analysis measured in ice cores from

Table 1. Strontium isotope analysis of one of the grape seeds retrieved from the Tissø complex.

Lab. Nr.	Pre-cleaning procedure	Dissolution procedure	Weight (mg)	Sr (ppm)	$^{87}Sr/^{86}Sr$	2 SE (abs)
KF 847	HCl and HF leachates	HNO_3 and H_2O_2	4.4	14.234	0.71091	0.00004

Greenland, as for example, compiled by Ljungqvist (2010), indicates that the climate in the period from 800–1200 C.E. (the so-called medieval warm period) was comparable to the present-day Danish climate. This climate was probably suitable for the cultivation of grapes. This can be supported by the fact that a letter from Pope Gregor IX (Hermansen 1938) mentions vineyards owned by the Cistercian monastery in Sorø only 25 km southeast of Tissø. This letter was written in 1228 at the end of the warm period where the climate was beginning to turn colder. Also an indirect indication of grape cultivation in the same period is provided by a recipe that mentions the use of fresh grapes in the oldest Danish herbal book by the Danish physician Henrik Harpenstreng (Kristensen 1908-20). It thus seems likely, that the climate during the late Germanic Iron Age and the Viking Age periods was also suitable for cultivating vine locally within the Danish area.

Archaeobotanical evidence

Archaeobotanical evidence of grapes in Scandinavia is known from only two other sites before the Middle Ages. In Hedeby (ON *Haithabu*) in the region of Northern Schleswig, excavations provided the find of an uncarbonised seed of grape. In this matter it has been generally accepted that the Hedeby grape could be the remains of import of raisins or badly sieved wine (Behre 1983). Both are aspects which would resemble Hedeby's function as a trading centre, where all kind of goods passed through (Jankuhn 1986). In addition to this, two uncarbonised seeds from common grape vine were found in an urn from a Viking Age grave on Gotland, Sweden (cf. Figure 3) (Hjelmqvist 1993). Hjelmqvist has proposed that these grapes most likely could have been cultivated locally, however he also suggests the possibility of import of dried grapes (Ibid.). To these two finds we can now add the two grape seeds found at the Tissø complex. Other than these scarce finds, we have to go as far away as York, England to find traces of prehistoric grapes in Northern Europe. Here several finds have been made of grapes dated as early as to the 2–4th centuries CE (Hall and Kenward 1990) and later from the 9–13th centuries CE (Kenward and Hall 1995).

Prior to the find presented here, the oldest known Danish seeds from grapes comes from an excavation at Kgs. Nytorv in Copenhagen dated to the late medieval period (Moltsen and Henriksen 1998). However, this was in an area where we know that the Danish king had a vineyard in the same period (Fabricius 2009).

Archaeological evidence

While evidence of the consumption of raisins or fresh grapes in prehistoric Scandinavia is almost non-existent, there are plenty of wine-related archaeological objects from Denmark. Here especially the Roman drinking sets with vessels and sieves built into a scoop etc. provide us with some indications of a sort of wine-consumption knowledge already in the Roman Iron Age – although we here need to consider if the Roman drinking sets served the same function in the North as they did in the Roman areas. In a recent study of a wine sieve from the Bronze Age and a bronze bucket from the late Pre-Roman Iron Age found in Denmark, McGovern *et al.* (2013) have through chemical analyses established that the objects under study contained traces of wine. However, since the container and the wine sieve are imports from Southern and Eastern Europe, where we know they produced and consumed wine, the traces could stem from their original function on the continent. Thereby these finds do not necessarily reflect that Bronze and Iron Age Scandinavians consumed wine – although import of wine is a possibility from early on. At the harbour site of Hedeby as well as in the Frisian trading town of Dorestad (both trading centres throughout the Nordic Viking Age), remains of wine barrels are found (e.g. Jankuhn 1986:152). This could imply that wine, although somewhat later than the Roman drinking sets, was actually a traded commodity and in demand from some people in the North. The wine barrels were at these two sites reused as lining for wells (Behre 1983, p. 109) but whether they actually contained wine when arriving at the sites is uncertain.

Other than these finds, we do not have any clear archaeological indications of wine production or consumption within Scandinavia. What we do have, however, is different Frankish annals and continental descriptions, which mention wine in

connection with Viking Age Scandinavians. In the following some contemporary written sources from the continent will be considered, since they can add some information, particularly regarding the reason why two grape seeds ended up in the archaeological remains at Tissø.

Written sources

Despite the small number of actual seeds from vine grapes in Scandinavia we do have numerous contemporary written sources which address wine in connection with late Iron and Viking Age Scandinavians. For example, the accounts from the Royal Frankish Annals (*Annales regni Francorum*) describe several episodes of how men from the North and the Normans, who had settled in Normandy, France, both raided and from time to time negotiated tribute payments which involved wine in order to leave the Frankish Empire in peace (e.g. Albrectsen 1976). The Royal Frankish Annals also describe that when Harald Halfdannson (i.e. *Harald Klak*) in 826 sailed down the Rhine approaching the Ingelheim *Pfalz* complex, near Mainz, to be received at the royal court by Louis the Pious (son of Charlemagne) he would a few days after receive large amounts of gifts and also *wine fields* (e.g. Wamers 2016, p. 69 f.). Almost 40 years later, in 864, the *Annales Bertiani*, reports that Rodulf (a Dane related to Rorik in Dorestad) demanded a tribute payment where Lothar II should '… raise four denarii from every landholding (*mansus*), together with a large amount of flour, *wine*, beer and cattle' (Coupland 1998, p. 101, emphasis added). Some years later, in 885 the Annals of Fulda describes how Godfrid (a Dane who had become a vassal of Charles the Fat) sent two men to the Emperor saying that if he wanted Godfrid to remain faithful and loyal he should enlarge his territory by granting him *wine-producing* lands from the royal fisc in Koblenz, Andernach and Sinzig, and it seems that he actually got what he wanted according to the Annals of Fulda (Coupland 1998, p. 111). Also the Vita Anskarii (written around 875 CE by Rimbert) provides clues which indicate that some Scandinavians knew of and indeed consumed wine. In the vita, a description is found of a woman in Birka, Sweden who refuses to sacrifice to the old heathen gods because she is a converted Christian. Since there was no priest at Birka at that time, the woman kept a small container of wine which she instructed her daughter to give her when she died (Jesch 1991, p. 89 f.). Furthermore, the daughter was instructed to give away the mothers accumulated wealth in alms of the Frisian trading centre at Dorestad. Here Rimbert described that the daughter distributed the alms as she was told and visited holy places. However, one day miraculously her empty bag of money was replaced minus four pennies which she had spent on *wine* to refresh herself and her companions (Jesch 1991, p. 89 f.). Although one must always consider written sources, as the ones presented above, with great caution, they do provide a many faceted picture of Scandinavians having knowledge of wine as a beverage (for discussions concerning archaeology and the use of textual evidence see, e.g. Andrén 1998, Sherratt 2011, Shanahan 2015, particularly chapter 1).

Local vine, wine or raisins?

As addressed above, there are some indications from both archaeology and historical sources that vine was known in Scandinavia during the later part of prehistory – and the current archaeobotanical and strontium isotope analyses of the Tissø seeds have only reinforced this picture.

It is given that the vine plants could have been used to provide the elite residing at the Tissø complex with fresh or dried grapes, consumed as a sort of raisins. However, we do also have indications of late Iron and Viking Age people enjoying alcoholic beverages. The consumption of alcoholic beverages in prehistoric Scandinavia is a topic many scholars find fascinating, and wine is no exception in this matter. There are thus several ongoing discussions concerning from when and to what extent Scandinavians knew of and consumed alcoholic beverages, including wine (See, e.g. Nielsen 2002, p. 184 and particularly the following discussion, pp. 202 f.; Koch 2003, McGovern *et al.* 2013). It is, still, commonly agreed that whatever the extent of wine for consumption within Scandinavia it probably came to the North as an imported luxury/trade good, since the nearest known vine fields are in present-day Germany (e.g. Winroth 2012, p. 81 f.). This is, however, something that needs to be reconsidered since

theoretically the present find from Tissø could have served to produce wine after the continental model.[3]

If one trusts the written sources, they indicate that some higher standing Scandinavians (probably people from the aristocratic/kingly elite) knew of and consumed wine and that some of the Danes in service in the Frankish Empire also gained access to wine-producing fields. The latter is especially interesting, since the granting of wine-producing fields in the Frankish Empire could mean that some Scandinavians would then gain knowledge on how to produce wine – knowledge which they could then bring back to Scandinavia. The knowledge of wine could also have its origin from people travelling to England (hence, the grape seeds from York). However, direct archaeological evidence of wine production within Scandinavia is unfortunately lacking and we can thus only imagine what the vine grapes were used for. It is, nevertheless, of significance that the evidence points towards vine plants or seeds at some point being imported from the south and/or the insular areas and hereafter locally cultivated. It is tempting to place the grapes within the wine scenario based particularly on the written evidence – however, at present it is just as likely that the grapes were consumed fresh or dried. In order to broaden our knowledge of the use of vine grapes within Scandinavia, one can thus hope that the present find is only the beginning and that more seeds from grapes will be discovered in the future.

Notes

1. The excavations carried out in 2012–13 were funded by *Aage & Johanne Louis Hansens fond til almene formaal*. The analyses presented in this article are part of the 5-year research project 'pre-Christian cult places' (2010–15) on the National Museum of Denmark financed by *A. P. Møller og Hustru Chastine Mc-Kinney Møllers Fond til almene Formaal*.
2. Pollen from grapes dated to the neolithic has been found in two places in Denmark. It cannot be determined if these comes from wild or cultivated grapes (Mikkelsen 1949, Troels-Smith 1953).
3. Although it cannot be determined if the seeds came from the wild, the cultivated or a hybrid variety of grape all of these could have been used for the production of wine. Ocete *et al.* (2015) have successfully made wine with high alcohol content from wild grapes.

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RESEARCH ARTICLE

Late Iron Age longhouse chronology. A study aimed at constructing a formal house chronology for the Late Iron Age, based on selected localities in central and eastern Jutland

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ABSTRACT

This paper presents a formalised chronological study of the longhouses of the Late Iron Age. This is based on the correspondence analysis of data relating to house ground plans recorded at a number of Iron Age settlements in central and eastern Jutland, which, as a region, has the most comprehensive relevant data set, including many constructional details. The chronology constitutes a formalisation of the house-chronological considerations undertaken to date in reference to settlements in Jutland and results in a seriable sequence, the chronological significance of which is supported by stratigraphic observations. The study demonstrates that, in general, the investigated settlements follow the same chronological development and can therefore be correlated. Moreover, it shows that the placing of each individual house in the chronology is subject to some uncertainty, due to the relatively small number and long duration of the chronological features.

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Late Iron Age; settlement archaeology; chronology; correspondence analysis

Introduction

Since the introduction of areal excavations in plan at the beginning of the 1960s, the number of known village settlements has increased explosively. Rescue excavations, not least, have played a decisive role in this respect, although, in relation to the Late Iron Age, the major research excavations of the 1970s and early 1980s continue to occupy a central position. This is true in particular of the total excavations of the localities of Vorbasse (Hvass 1988) and Nørre Snede (Hansen 1988), but sites such as Hodde (Hvass 1985) and, not least, Vendehøj (Ejstrud and Jensen 2000) have also been important for the interpretation of the structure, organisation and chronology of Early Iron Age settlement.[1]

The chronological foundation for an interpretation and understanding of these sites builds on four methodological components: house chronology, stratigraphic–architectonic analysis of the internal settlement development, typo-chronological dating of finds and radiocarbon dating, typically of plant macro-remains found in the buildings' postholes. These four methods can be considered as complementary as they have partly different areas of application and contribute information on different aspects of the chronology of these settlements.

The house chronology has been an absolutely indispensable tool in the elucidation of the development of the settlements and, consequently, the interpretation of these sites, even though it could not serve unsupported as a reference. It constituted an important foundation for both the chronological sorting of the individual sites and for correlating these in relation to each other. Its importance is due, not least, to the sparse occurrence of date-conferring finds at these sites. Increased use of radiocarbon dating has, however, begun to deliver a new chronological base. Nevertheless, it must be expected that the relative house chronology will continue to be significant due to the methodological constraints and uncertainties inherent in radiocarbon dating of settlements excavated in plan – especially those of long duration.

The major research excavations at Vorbasse and Nørre Snede have taken up a central position in the construction of the existing house-chronological models. The results have been presented in various articles and brief overviews focussing on the sites'

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longhouses (Hansen 1983, 1988, 1989; Mikkelsen 1988, 1999; Hansen *et al.* 1991, Hvass 1979, 1983, 1989, 1993; Siemen 1989). The house typology established and published in the late 1980s and early 1990s is still the most used with respect to the dating and interpretation of the longhouses of the Late Iron Age.

Already in the late 1980s, however, it was clear that the house typology for Jutland could not be applied to Iron Age sites on Zealand. The Zealand house architecture is of a different character and the settlement pattern is much more 'hamlet-like' in structure (Boye 1992, 2011, Fonnesbech-Sandberg 1992). Similarly, developments on Funen also proved to follow a separate course (Hansen 2016). In Jutland, the house typology and chronology established on the basis of Vorbasse and Nørre Snede is still employed (Hansen *et al.* 1991), supplemented by a few other observations from more general settlement publications (Ethelberg 2003).

The existing house chronology is based on a number of constructional traits that can be observed in the sites' house ground plans and which are considered to have chronological significance. Some of these traits are metric developments over time, while others are special constructional elements, deemed to belong to specific time periods. The identification of these elements was initially based upon the preliminary interpretation of the overall spatial–chronological displacement of the settlements, which in itself relied to a large extent on pottery dating, other artefact dates, and to some extent stratigraphical evidence and considerations on the possible duration of the village phases (Hvass 1989). Later, when a house typology had been established, the dating of the different house types was tested by studies of the pottery found in these buildings (Mikkelsen 1988). The house chronology is illustrated in the various publications with examples of longhouses representing the individual chronological phases (see Figure 1).

Of the metric dimensions, the width of the span of the roof-supporting posts relative to the total width of the house appears to have great and particular significance. A gradual reduction in the relative width of the span of the roof-supporting posts is evident – from 58% in the 1st and 2nd centuries AD, i.e. in the Early Roman Iron Age, to 38% in the 5–7th centuries AD, i.e. in the Late Germanic Iron

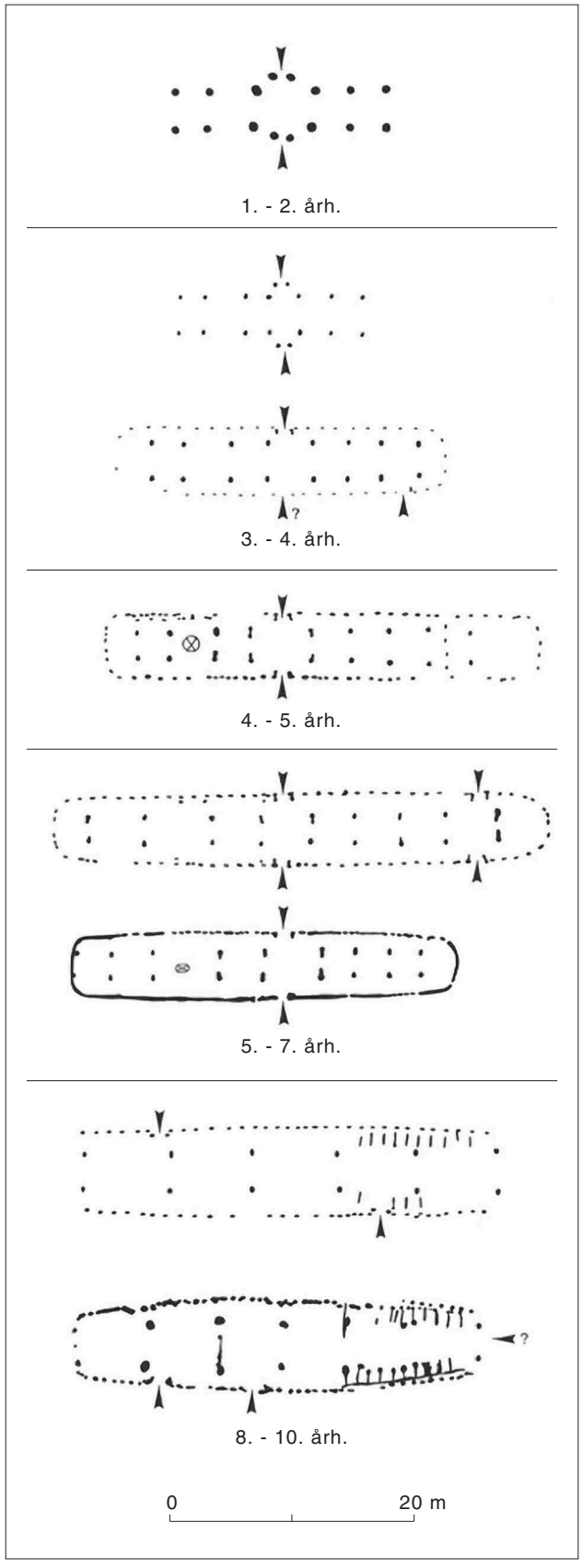

Figure 1. Chronological sequence of the longhouse types from Jutland in the Late Iron Age according to (Hansen *et al.* 1991). Drawing D. Kaldal Mikkelsen. Permission to publish obtained.

Age. The central aisle becomes very narrow, while the width of the house remains more or less unaltered. Synchronously, a development takes place in the position of the postholes, especially at the end of the house hosting the living quarters. Here, modular rooms with four sets of roof-supporting posts characterise the houses of the Late Roman Iron Age and Early Germanic Iron Age, whereas later, in the Late Germanic Iron Age, the roof-supporting posts are more evenly spaced relative to each other. In general, the relative position of the roof-supporting posts appears to be significant with regard to the dating of these longhouses (Hansen *et al.* 1991).

In the Late Germanic Iron Age, some of the houses also lack one of the roof-supporting posts in the third set from the entrance, and the final set before the gable may have a narrower span than the other sets in the building. As for the walls, their course, in particular, has been highlighted as being chronologically significant, with a development being observed from straight to curved. In addition, wall trenches have been considered a relatively late phenomenon. At the end of the Late Germanic Iron Age and in the Viking Age, the gables become straight and are reinforced with a set of roof-supporting posts, and the entrance 'hall', with opposing entrances, disappears. The curved course of the walls, and of the roof-supporting posts, also becomes more pronounced (Mikkelsen 1988, Hansen *et al.* 1991).

Despite the crucial significance of the house chronology, no formalised chronological study has yet been carried out of the data relating to these house sites. Moreover, it remains unclear to what extent the house chronology is actually relevant beyond the two sites on the basis of which it was developed: Nørre Snede and Vorbasse, cf. the evident regional differences mentioned above. There is a strong need for a formalised method enabling a correlation between sites. This will provide a better understanding of settlement structures and demographic developments.

The key role of earlier sites in the definition of the chronology to date is in part due to nature of the available published material on the subject and not necessarily an expression that they provide a comprehensive picture of the chronological development. Due to the many major Iron Age settlements excavated in recent years, there is therefore a clear need for refinement of the chronological–methodological tools for use in both the elucidation and the interpretation of these often extremely large and complex Iron Age villages. Similarly, there is a requirement to clarify the typology, and the chronology's regional and supraregional validity, as well as its strength and robustness: Just how clearly delimited and reliable are the chronological features as chronological indicators? Is it at all possible to employ the existing typology as a 'generally applicable' tool, or does in reality only represent local conditions and situations? This regional variation has increasingly come into focus in a number of other research areas, with major apparent differences in the grave record being observed between Jutland, Funen and the other islands, and with the division of the burial practices on Jutland into two main regional groups[2] (Ringtved 1988, Henriksen 2009). Similar diversity is evident in war booty deposits, which have their main distribution along the east coast of Jutland and on western Funen, while displaying a much more limited character on eastern Funen and Zealand and being completely absent from western Jutland (Iversen 2010).

The archaeological record for central Jutland does, however, in some respects constitute the most obvious point of departure for the chronological analysis. This is due partly to the previous work undertaken here, and partly to the generally good state of preservation of the building traces and the consequent comprehensive body of data, with a degree of detail that allows the identification of chronologically significant elements and stratigraphic relationships.

In the following, the results are presented of a study that had the aim of formalising the existing chronology for longhouses and testing whether this can be transferred to other sites in central and eastern Jutland. Methodologically, the study is based on correspondence analysis. Empirically, it builds on the house remains at one of the two classic settlements, i.e. Nørre Snede, combined with longhouses from a number of other selected settlements in eastern Jutland.

Selected Iron Age sites in eastern Jutland

In this house-chronological study, ground plans were employed from eight localities in eastern

Figure 2. Distribution of the locations mentioned in the text.

Jutland (see Figure 2). These were chosen on the basis of state of preservation, and within a relatively limited geographical area, for the purposes of constructing a formalised house chronology. Nørre Snede was one of the sites selected, in order to ensure a link to previous work on the subject and due to the magnitude of this site.

Nørre snede

Most of the settlement at Nørre Snede in central Jutland was excavated between 1979 and 1986, followed by a few minor, supplementary investigations. The site is dated to the Late Iron Age, *c.* AD 150–700, and is characterised generally by well-preserved building traces and no cultural layers. In total, an area of 80,000 m^2 was excavated, and the site is considered to have been almost totally excavated, with the exception of the later part, which presumably lies partially beneath the present-day town of Nørre Snede. An earlier, possible predecessor settlement has also been located to the northeast. In all, 179 longhouses were identified and distributed between about 45 farmsteads (Hansen 1988, Holst 2010). Of these, 89 were sufficiently well preserved, with characteristic constructional elements, for them to be included in this study.

The investigations at Nørre Snede were carried out as part-rescue, part-research excavation, the latter as a parallel to the contemporary investigations of the Vorbasse settlement. This role became very evident in publication terms in subsequent years, when Nørre Snede, together with Vorbasse, occupied a prominent position in descriptions of the village society of the Late Iron Age (Hedeager 1982, Hvass 1988, Hansen *et al.* 1991).

Hummelure (FHM 5147)

Between 2009 and 2012, Moesgaard Museum undertook excavations of a large Iron Age village at Hummelure near Skjoldelev, west of Aarhus. Here, were settlement traces from the Late Iron Age (*c.* AD 200–700) and the site was well preserved by eastern Jutland standards, which made it possible to undertake a major investigation of a locality at village level. The locality was already known to the museum, because in the 1980s, a couple of brief excavations was carried out here in connection with the laying of a natural gas pipeline (Jeppesen 1987). These uncovered parts of two farmsteads dating from the Late Roman Iron Age and Early Germanic Iron Age, as well as inhumation graves from the Late Roman Iron Age and Viking Age. The excavations in recent years have, together with the earlier interventions, yielded a total of 21 longhouses, some with several phases, distributed between about seven more or less coeval farmsteads. A total of 14 longhouses from Hummelure have been included in this study.

Hammel storgård (FHM 4641)

In many ways, this locality resembles the Hummelure site and it lies only about 10 km to the west. It was excavated in 2005 and 2006 in connection with the development of an approximately 20-ha area in the western part of Hammel. An area of 2.2 ha was excavated in total, revealing structures

from the Neolithic and Bronze Age, in addition to – not least – a large settlement dating from the Late Roman Iron Age and Early Germanic Iron Age (Ravn 2009). The latter consists of a few coeval farmsteads, which remained more or less fixed in a given position through several construction phases. In all, 12 construction phases were identified, distributed between three farmstead plots, of which one had as many as eight phases. The excavation led to the identification of 34 Iron Age houses, of which 18 are interpreted as longhouses. Of these, eight were found to be suitable for inclusion in this study.

Bendixminde 5 (FHM 5433)

Trial excavations in connection with the Odder Municipality's development of 54 ha of land led to the identification of a total of six areas containing prehistoric structures that were deemed worthy of further archaeological investigation. These areas had settlement traces from the Late Bronze Age, Late Pre-Roman Iron Age and both the Early and Late Roman Iron Ages (Jensen 2015). Area 5, in particular, consisted primarily of settlement from the Early and Late Roman Iron Ages and contained the best preserved houses from this period and, consequently, the houses that were also best suited to correspondence analysis. The excavation at area 5 covered a total of 2.2 ha, leading to the discovery of 16 longhouses and a further 21 smaller, three-aisled buildings and 10 four-posters. The settlement in area 5 should be viewed in the context of the results of the other excavations in the fields at Bendixminde (areas 2–6) and indicates a continuous settlement sequence extending from the end of the Late Roman Iron Age to the beginning of the Early Germanic Iron Age. Unlike at Nørre Snede, Hummelure and Hammel Storgård, there is no complex, coalesced village here, but one or two coeval farmsteads. Only three of the longhouses at Bendixminde were deemed suitable for inclusion in the study.

Tjørnagergård (FHM 5608)

This is a village settlement from the Late Roman Iron Age and Early Germanic Iron Age located on the eastern margin of Hadsten and is consequently the northernmost settlement represented here. It was relatively well preserved and comprised a minimum of two to three farms with one or two phases. The excavation, which covered an area of 4500 m^2, took place in the late summer of 2015, and was prompted by a planned, private development. The settlement that was excavated is presumed to be the outer marginal area of a large uninvestigated Iron Age village, which probably lies beneath modern buildings immediately to the east. It is therefore not possible to determine whether the remains at Tjørnagergård have the character of a major village complex on the lines of, for example, Nørre Snede or Hummelure. Only one house from Tjørnagergård has been included in this study.

Ingerslevvej (FHM 4845)

In 2007 and 2009, a major archaeological excavation was carried out on a 2.7-ha area at Tranbjerg, south of Aarhus. This focussed on an Iron Age settlement with as many as 21 longhouses, dating from the Early Roman Iron Age to the Late Germanic Iron Age. The excavation took place in advance of a large development. The settlement is characterised by three to four coeval farms with up to three phases. Interpretation of the farmsteads' mutual relations was however difficult as the preservation conditions were relatively poor. Traces of fences only survived in a few places and the wall postholes of the longhouses were badly preserved. Consequently, only one house was found suitable for inclusion in this study.

Kirstinelund (FHM 4792)

In 2006 and 2007, Moesgaard Museum undertook a rescue excavation of a 7200-m^2area on the southern margin of Harlev, approximately 15 km west of Aarhus. There were two excavation trenches encompassing two farmsteads. One of these is interpreted as a single farm with one phase, while the other is presumed to have had two to three phases. A total of five longhouses could be identified. The farms are dated to the Late Roman/Early Germanic Iron Age. Only one of the longhouses from the site was included in the study.

Haldum urebro II (FHM 5516)

Prompted by a planned development, a major archaeological excavation was undertaken in autumn 2015 of a village-like settlement at Haldum, west of Hinnerup. Moesgaard Museum had also carried out an excavation here prior to this, in 2011, in connection with the first phase of the development immediately to the east. On

this earlier occasion, settlement traces were found from the Late Bronze Age and Early Pre-Roman Iron Age. Consequently, there is no direct continuity with the remains uncovered in the most recent excavation at Haldum Urebro II, which are dated to the period from the Late Roman Iron Age to the Late Germanic Iron Age. The Late Iron Age settlement covered an area of almost 2 ha and comprised a minimum of three to four farmsteads with up to four phases. Seven longhouses could be identified, in addition to various smaller buildings and fences. The state of preservation of the settlement remains varied and only two of the longhouses were found suitable for inclusion in this study.

The selected settlements display clear similarities in their architecture, variation in settlement pattern and in duration. Nørre Snede constitutes a large village community of long duration, while Kirstinelund appears to be a single farm settlement with few phases. The Hammel Storgård and Hummelure sites are particularly similar, and the former lies only 10 km to the west of the latter. The two villages functioned at the same time over several generations, and even though Hammel Storgård does not have the same extent as Hummelure, either physically or temporally, both localities can be characterised as villages with extensive and complex settlement traces (Figures 3 and 4) extending over several centuries. There are also striking similarities between Hummelure and Haldum Urebro II. Both villages appear to have had the same organisational structure, so-called båndparceller, i.e. villages where developments over time lead to the formation of rows or bands of plots, within which the individual farmsteads can be identified – sometimes with several phases (see Figure 5).

Consequently, these were not permanent farmstead plots that remained stationary through up to seven or eight phases, as was the case at Hammel Storgård, but rather a settlement with up to three or four coeval farms arranged in a row. Ultimately, if there were numerous replacements, this could gradually lead to one single farmstead plot covering a very large area.

Method

Classification system

Based on previous studies of the longhouses of the Late Iron Age, and the various attempts to establish house typologies and chronologies, a system of classification and description was constructed for the longhouses at Nørre Snede: This was then used to classify the well-preserved examples of longhouse sites. This system attempts to include as many as possible of the previously proposed chronologically significant elements. The definitions of some elements have been modified in order to accommodate impressions gained through re-examination of which traits are chronologically significant, and some further constructional elements have also been included (Holst 1999, 2000, 2004).

A total of 83 longhouses (objects) have been included in the study, 14 from Hummelure, 53 from Nørre Snede, 8 from Hammel Storgård, 4 from Bendixminde, 2 from

Figure 3. Complete excavation plan of the Hummelure site.

Figure 4. Complete excavation plan of the Hammel Storgård site.

Haldum Urebro II, 1 from Tjørnagergård, 1 from Ingerslevvej and 1 from Kirstinelund, and 15 elements or categories were considered to be chronologically significant and thereby suitable as variables in the classification system (see Figure 6). Most of the variables are non-measurable constructional categories that can be characterised as architectural traits visible in the ground plans of the longhouses. A few of the variables are directly measurable categories, based on the width of the central aisle as a percentage of the total width of the house. This calculation was performed on the dwelling end of the house, through the first set of roof-supporting posts from the entrance section – conditional on the house having a well-defined entrance.[3] In the final analyses, two extremes were employed in the measurable size categories: narrow ≤37% and wide ≥44%. The intermediate values were not included as the preliminary analyses showed that these had no chronological significance. The roof-supporting posts in the utility section in the longhouses were classified as densely spaced if the longitudinal span between the sets was less than the transverse span between the two posts of the set. Common to all variables is that they are recorded in the table as either *present* or *absent*.

The classification of the spacing of the wall posts was based on a subjective estimate, as the metric distinction proved problematic, especially when the houses had been repaired or rebuilt in the same location, where an exact reconstruction of the walls in their entirety was not possible. The boundary between the categories is seemingly gradual, and in the majority of cases, the walls were consequently not classified, as the spacing was somewhere in between diffuse and dense. Nevertheless, even though the classification is based on a subjective estimate and the transition is gradual, the categories may very well reflect real constructional differences, for example, wattle-and-daub or stave construction of the house walls, with densely spaced posts, as opposed to bole construction, with widely spaced posts.

Similarly, the classification of the curvature of the gables also relied upon a subjective estimate, as metric distinction proved inapplicable due to variation in the state of preservation.

Correspondence analysis

The recorded data were subjected to correspondence analysis. This method is well established in archaeology as an instrument for searching for seriation as an expression of chronology (Madsen 1988, 1991; Baxter 1994). The analysis relies on recording presence/absence of a number of pre-defined categorical

Figure 5. Complete excavation plan of the Haldum Urebro site.

variables for each object included in the analysis. In this case, the variables are various architectural traits, while the objects are the longhouses. The basic principle is that a seriable data set results in a parabolic distribution of objects and variables on the plot of the 1st and 2nd axes of the correspondence analysis. In a specific analysis, the chronological significance of various variables and objects can thereby be tested in relation to the degree to which they result in a parabolic distribution. A matrix of objects and variables sorted according to the course of the parabola can then be used to evaluate the quality of the seriation. If the aim is to achieve a perfect result, expressed through a more or less faultless parabola, the data set should comprise a large number of independent variables, and consequently several possible combinations, as can be seen, for example, in chronological studies of grave finds (e.g. Bayliss *et al.* 2013). In practice, the longhouse data cannot be able to satisfy these criteria, as they only permit the identification of a relatively limited number of variables and with some degree of uncertainty in their identification. Both variables and elements must be represented by at least two occurrences for them to be included in the analysis. The variables employed were, accordingly, the end product of a process whereby some were excluded because some categories lay too close to each other typologically were too common and therefore did not have a chronological expression or, conversely, because the individual variable only had a single occurrence. Variables may also have been excluded if the category proved to have no chronological relevance and thereby only disrupted the results.

In practice, the correspondence analysis was conducted as a series of repeated analyses, with various combinations of elements, in an attempt to identify chronological structures in the data set. The resulting seriations were compared with other chronological evidence, such as the dates of the finds recovered from the houses, or stratigraphical observations, in order to test the reliability and chronological direction of the seriation.

In principle, there was no manipulation involving the exclusion of objects, i.e. the classified longhouses. However, with the varying exclusion of variables, some of the houses were characterised by less than two variables and had, consequently, to be excluded from the study.

Results and interpretation

The most distinct plot, and the matching seriation of the longhouses according to the 1st and 2nd principal axes, is presented in Figures 9 and 10. As can be seen from the plot of the correspondence analysis, the intended parabolic distribution of both variables and objects is achieved. Not surprisingly, the parabola does not describe a perfect curve. This can be attributed to the fact that the variables are generally of long duration, that there are relatively few chronologically significant variables and that the variables are, in some cases, characterised by subjective, non-measurable evaluations; this leads to some uncertainty in the identification. Nevertheless, the parabola displays an even and clear distribution of the objects (the

LIVING SECTION

Variables	Values	Examples
Lenght	/m	
Width of nave at 1st set of roofsupprting posts /m		
Width of left aisle at the 1st set of roofsupporting posts	/m	
Width of right aisle at the 1st set of roofsupporting posts	/m	
Number of sets of roofsupporting posts		
Orientation	Living section in the eastern end of the house/living section in the western end of the house	
Gable technique	Single row of posts	
	Double row of posts	
	Trench construction	
Gable Course	Round	
	Roundet	
	Straight	
Internal organisation: order to room types from the entrance and inwards	Module room-Main room-Module room	
	Module room-Main room-gable room	
	Main room-Module room-Gable room	
	Even sized rooms	
Three sets of roofsupporting posts in generel	Presence/absence	
	Atypical arrangements of roof-supportings posts	
Special features: Missing roofsupporting post ind the main room	Presence/absence	
Special features: narrow span in the last set of roofsupporting posts	Presence/absence	
Special features: Double post construktion in the walls of the main room	Presence/absence	
Special features: Extra posts in the gable in line with the roofsupporting posts	Presence/absence	

Figure 6. The system of classification and the description of the longhouses, with examples of the different categories.

longhouses) that, together with the matrix, illustrates a general seriable development.

Similarly, the seriation matrix reveals a general trend but does not provide an absolutely clear picture.

The variables have generally a relatively broad distribution and the individual entities are characterised by only a small number of them.

To sum up, the correspondence analysis revealed a distinct structure in the longhouse data set, characterised by progressive change and with limited clustering. The data set cannot, however, be described as perfectly seriated.

The next question is whether this apparent structure does in fact reflect the chronology. If the plot of the correspondence analysis is studied more closely, it becomes apparent that the variables arrange themselves in a sequence relative to one another, in which certain individual elements concur with the generally accepted chronological interpretation: For example, the categories *broad relative width of the central aisle* and *densely spaced roof-supporting posts in the utility section*, to the extreme right of the plot. Both variables are categories that have traditionally been linked with the earlier part of the period, and other categories characteristic of this time are found here too. On the opposite side of the plot, to the lower left, are categories that are associated with the end of the Late Iron Age: These include *wall trench, gable trench* and *straight gable*.[4]

ENTRANCE ROOM

Variables	Values
Entrance: Technique	Single posts
	Double posts or multi posts
	combination
Entrance: Position	Recessed
	In line
	combination

ECONOMY SECTION

Variables	Values
Length	/m
Number of sets of roofsupporting posts	
Gable: Technique	Single row of posts
	Double row of posts
	Trench construction
Gable Course	Round
	Roundet
	Straight
Internal organisation: Arrangement of roofsupporting posts	Densely Placed
	Evenly dispersed
	Irregular arrangement
Special features: Traces of stall	Presence/absence
Special features: Reduced width of the nave in the economy section compared to the remaining house	Presence/absence
Special features: narrow span in the last set of roofsupporting posts	Presence/absence
Special features: Extra posts in the gable in line with the roofsupporting posts	Presence/absence

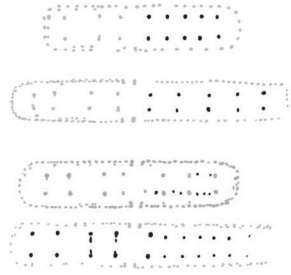

Figure 6. (Continued).

All in all, the plot can be considered as a chronological and more or less even development, which reads from right to left, and on which the known chronologically significant categories position themselves as expected. They thereby function as a kind of reference for categories that, to date, have not shown such a strong chronological expression. For example, *diffuse post positioning in the wall sides* lies in the earliest part of the plot, and this is also partly the case for *east-oriented dwelling section*. In the central part of the plot lie categories such as *densely spaced wall posts* and *double posts in the wall of the dwelling section*. Assuming that we are dealing with a chronological sequence, the spacing of the wall posts appears to have some chronological significance with widely spaced posts as a distinctly early element, while the densely spaced posts are associated with the relatively later elements, succeeded by the wall trench construction.

A couple of the other categories, such as the *east-oriented dwelling section* and *missing roof-supporting post in the hearth room*, also appear, in the light of the correspondence analysis and with the support of other categories, to have chronological significance. The missing roof-supporting post is found to belong in the middle/later part of the correspondence analysis and does not occur in longhouses that lie in the earliest phase, while *east-oriented dwelling section* is placed in the relatively early/middle group. In the data set from Nørre Snede, the proportion of longhouses with an east-oriented dwelling section is relatively high. Of the 53 Nørre Snede longhouses included in the study, more than 50% show this feature, while this applies to only about 25% of the

EXTRA SECTION

Variables	Values
Lenght	/m
Number of sets of roofsupporting	
Number of entrances	

GENERAL

Variables	Values
Roofsupporting posts: Longitudinal course of the rows of roofsuppor- ting posts (recorded for each side of the house independetly)	Diverging
	Curved
	Straight
	Converging/atypical
Walls:Longitudinal course of the rows of roofsupporting posts (recorded for each side of the house independetly)	Diverging
	Curved
	Straight
	Converging/atypical
Walls: Technique	Densely placed posts
	Dispersed posts
	Trench construction
	Differing despertion of the posts
	Combination(welldefined techniques in seperate parts of the wall

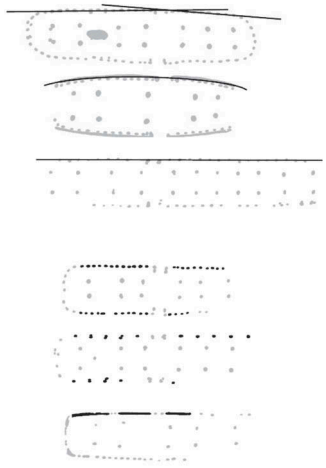

Figure 6. (Continued).

longhouses included in the analysis from the other sites. Moreover, several of the houses that had to be excluded from the study also show this trait. This is therefore not an isolated phenomenon at Nørre Snede, and it probably occurs more frequently than has generally been appreciated. At least the evidence suggests that longhouses with a 'reversed organisation' were relatively common during the Late Iron Age in eastern Jutland.

A few variables appear to have a relatively stronger chronological manifestation than others. This is true, in particular, of the measurable variables such as the *relative width of the central aisle*. But also categories such as *east-oriented dwelling section, curved walls* and *straight gables* appear more decisive relative to categories such as *missing roof-supporting post in the hearth room*, which has a slightly weaker expression. However, in combination with other elements, the latter can achieve strong significance.

Chronology and phasing

It is important to keep in mind that the results of the correspondence analysis are to be seen as indicating a general trend in the typological development of the longhouses over time. There is, accordingly, a limit to the detail of the chronological differences that can be demonstrated using the chronology. Situations must be expected to arise where the stratigraphic or other relative-chronological distinctions do not concur with the distinction in the seriation produced by the correspondence analysis. For example, there are two houses at the site of Bendixminde,[5] where one overlies the

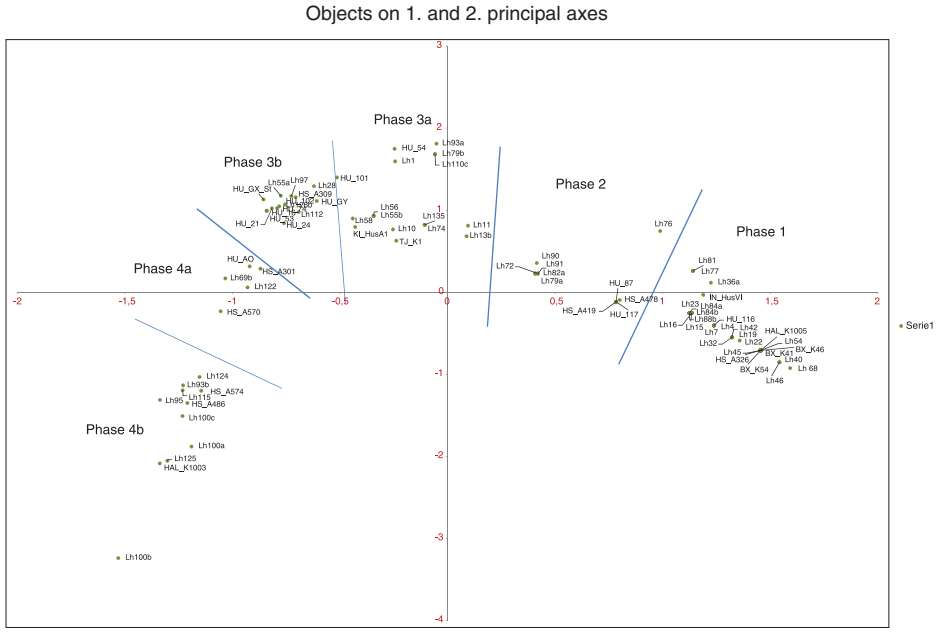

Figure 7. Plot of the distribution of the objects/longhouses on the first two axes of a correspondence analysis, with suggested phasing indicated.

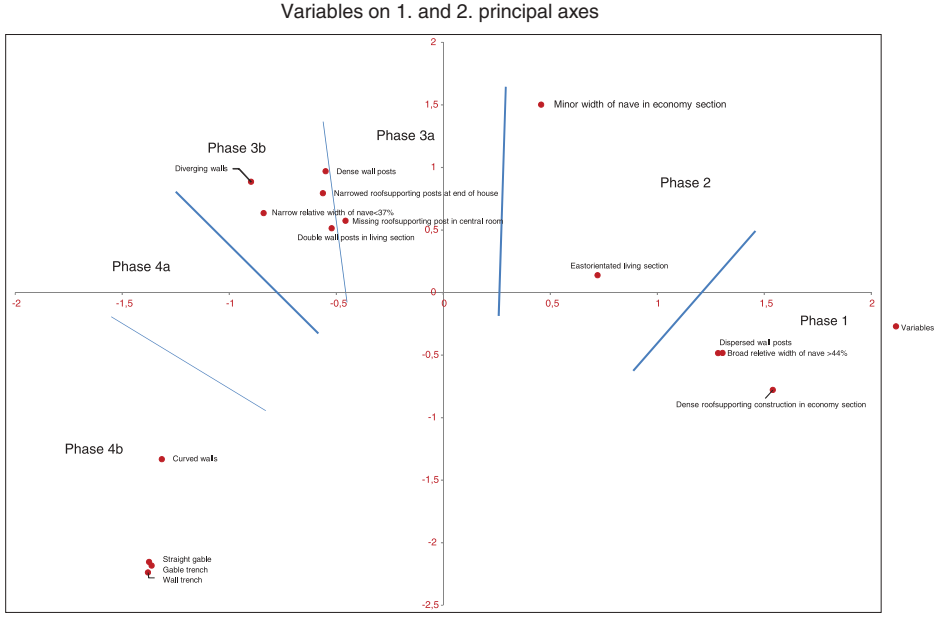

Figure 8. Plot of the distribution of the variables on the first two axes of a correspondence analysis of the longhouses.

other and is therefore stratigraphically latest. Even so, this is not evident from the correspondence analysis, as both houses only contain the same two variables. Consequently, they position themselves in precisely the same place on the parabola.

The large number of relative-chronological relations between the structural entities of the Nørre Snede and Hummelure settlements offer an efficient and totally independent way of testing the chronology. Figure 10 shows the various relations of the longhouses as revealed by the correspondence analysis. Only direct relations between the longhouses, and indirect relations of great certainty and with no more than one intermediate link, have been included. Furthermore, the list only includes directed types of relations, i.e. not those implying

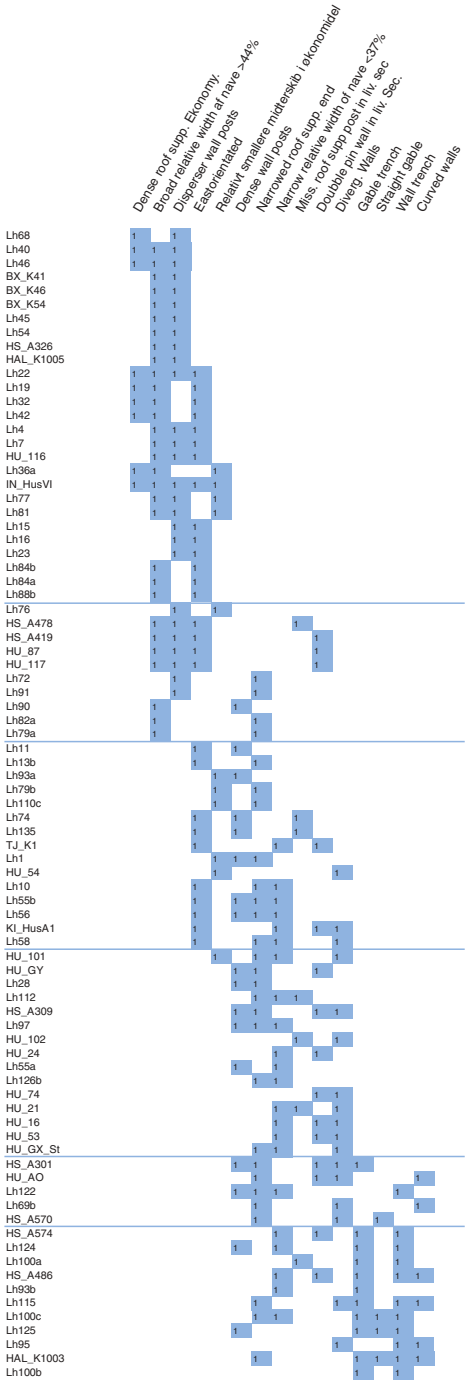

Figure 9. Matrix seriation of the longhouses.

contemporaneity or non-contemporaneity. If these relations are inserted into the correspondence analysis plot and colour-coded according to their agreement or disagreement with the presumed parabolic sequence from right to left, the graph shown in Figure 10 is the result. It is immediately apparent that the great majority of relations support the assumption of a chronological sequence. There are only three relations in disagreement with the chronological sorting and, furthermore, these relations are of relatively limited length, so the discrepancy does not challenge the overall structure.

In the cases where there is inconsistency with the stratigraphic and other relative-chronological observations, the houses in question do, however, lie within the same chronological phase/group. Relative to the chronological development, it must be considered acceptable that these inconsistencies occur between the positions of the longhouses in the results of the analysis and their relative stratigraphic positions at the individual sites as long as the houses simply occur within the same chronological phase.[6]

There are several possible explanations for these conflicting relations. First, there is some inherent uncertainty in the identification of all relative-chronological relations in the settlement analyses, even though only relatively certain relations have been included in the graph. Second, the identification of the variables in each longhouse is also associated with some uncertainty, which may result in an incorrect position for some houses. Third, and perhaps most importantly, the seriation matrix, and the correspondence analysis itself, clearly shows that the chronological sorting should not be conceived as an unequivocal and definite solution, but rather as a representation of general trends in the development of the longhouses. In other words, the relative position of the longhouses on the plot cannot be conceived as secure evidence of the relative-chronological order of the houses. As the correspondence analysis indicates a relatively gradual change in the longhouse data set, the exact delimitation of the phases is to some extent arbitrary. There are, however, certain tendencies towards clustering on the plot of the entities, and the boundaries between the phases have been drawn to respect these clusters.

It has proved possible to distinguish a total of four main phases (phases 1–4), with phases 3 and 4 each having two sub-phases (3a and 3b, 4a and 4b) (see Figure 7 and Figure 8).

In phase 1, which is clearly the largest group, a mixture is evident of houses from almost all the sites involved in the study. Three variables are particularly dominant, with the *broad central aisle* being especially characteristic of this phase. In almost all the houses, the width of the central aisle is 44% or more of the width of the house. This trait continues into phase 2, whereas there is a marked cessation at

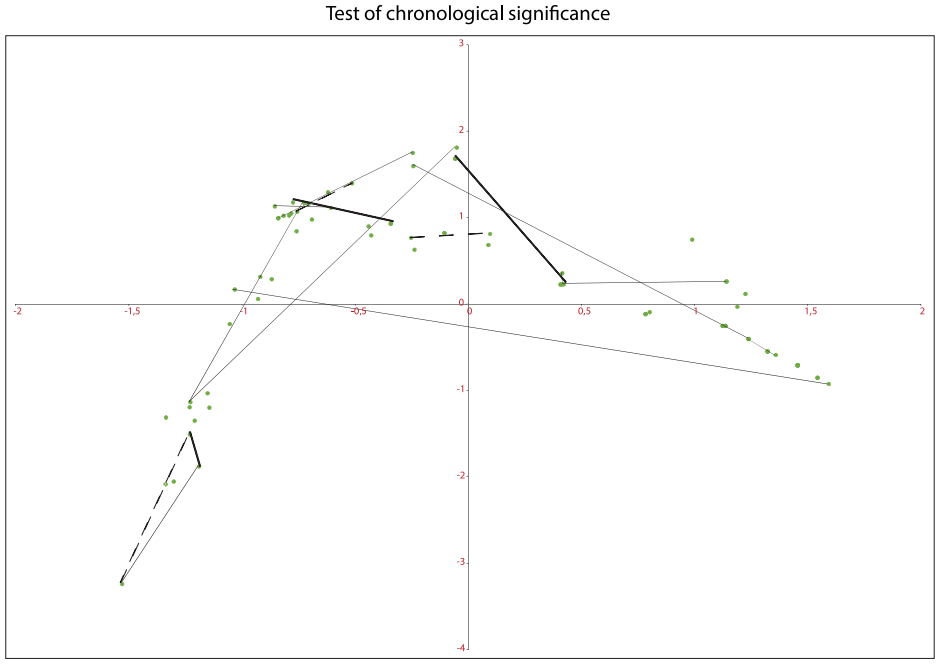

Figure 10. Test of chronological significance of the correspondence analysis of the longhouses. The relative relations have been inserted as lines on the correspondence plot. The lines represent the concordance between the direction of the relative chronological relations and the supposed chronological sequence of the elements in the correspondence analysis. Thin black line: agreement, dotted line: disagreement, thick black line: inconclusive.

the transition to phase 3a, when *diffuse post spacing in the wall side*, also prominent in phase 1, disappears too. Houses with an *east-oriented dwelling section* also lie mostly in phase 1, while this rather distinctive construction form declines in frequency in phase 2, before disappearing completely by the end of phase 3a. This trait is therefore very clearly associated with the earliest half of the longhouses, and the disappearance of the *east-oriented dwelling section* also marks the transition from phase 3a to phase 3b. These latter phases are characterised by the continuation of some traits, such as an *east-oriented dwelling section*, at least into phase 3a, and *relatively narrower central aisle in the utility section*, combined with new elements that appear during the course of phases 2 and 3a. A few new variables appear in phase 3a[7]: *densely spaced wall posts* which, combined with *east-oriented dwelling section*, the *narrow relative width of the central aisle* and *the narrow final set of roof-supporting posts*, characterise the longhouses in phase 3a. There is an even transition between phases 3a and 3b: Some of the elements from phase 3a continue, for example, the *relative narrow width of the central aisle*, which now appears very pronounced, and *diverging wall sides*, which also become more common. At the same time, houses with a dwelling section in the east disappear. There is an indication of a division in phase 3; yet, it is too vague to achieve an independent phase designation, hence the designation phase 3a and 3b.

In phase 4, further new elements appear. *Gable trench, straight gable, wall trench* and *curved walls* all emerge in the course of phase 4a, but only as single occurrences and not in combination with one another. Some traits continue from the preceding phase. Phase 4b has the same variables as phase 4a but is characterised by the combination of the new variables that were introduced at the beginning of phase 4. That is, *houses with gable trench* are seen in combination with *wall trench* or *wall trench/curved walls* or *straight gable/wall trench* or *wall trench/curved walls/straight gable* and, accordingly, never individually. Phase 4a is a transitional phase which share variables with phase 3b and new variables that become dominant features in phase 4b.

In addition to the gradual chronological development illustrated by the results of the correspondence analysis, these also indicate a degree of contemporaneity between house types and various constructional details. In Figure 11, examples of 24 longhouses have been arranged in accordance with the chronological sequence of the correspondence

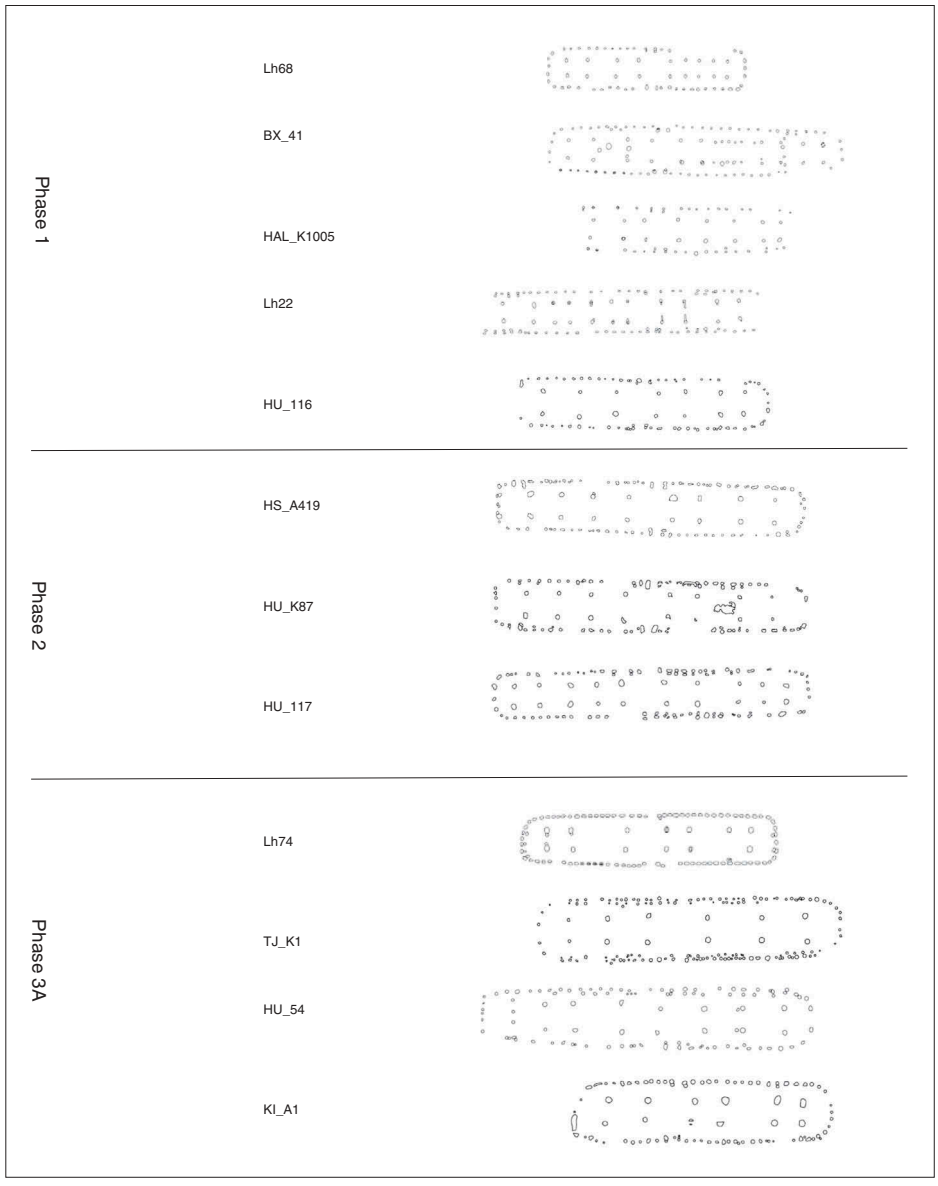

Figure 11. Chronological sorting of the longhouses exemplified. Twenty-four longhouses from the settlements arranged according to the sequence of the correspondence analysis.

analysis, with three to five houses from each chronological phase. The most obvious feature is the considerable variation in size, independent of the chronological development. Assuming that the size differences reflect, to some degree, the social and economic capacity of the household, this can be taken as an indication that the structure of the correspondence analysis is not influenced severely by social inequality. On closer examination, the examples also illustrate some important properties of the variables, which are also apparent from the seriation matrix. In addition to the long duration of the individual variables, these are also characterised by only being included in a subset of the houses during the timespan in which they are in use. This obviously complicates the chronological determination of the individual houses, and it can be seen as an indication that the typological development was not entirely uniform, and that there may have been several building traditions in operation within the settlement simultaneously.

One final aspect of the house chronology that deserves additional comment relates to the constructional variables not included in the final chronologically significant correspondence analysis. The most notable exclusion is probably those

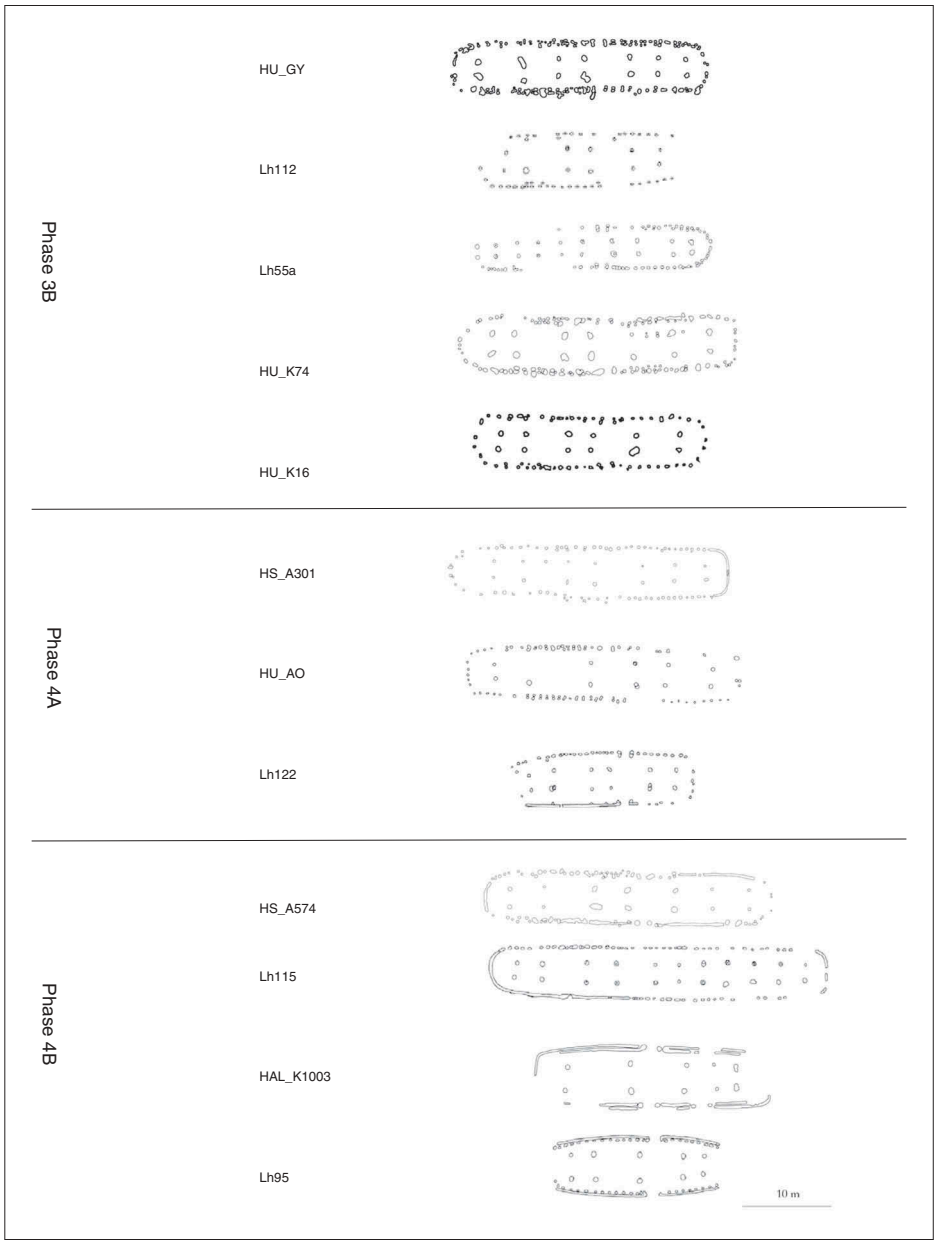

Figure 11. (Continued).

variables describing the internal arrangement of the living section. With the exception of the missing roof-supporting post in the room with the hearth, all variables characterising the arrangement of the roof-supporting posts in the living section had to be excluded. Atypical arrangements of the roof-supporting posts emerged as outliers in all analyses. This atypical arrangement is almost exclusively found in houses that either represented a rebuilding of an earlier longhouse in the same place or where the identification of the roof-supporting structure was associated with some uncertainty. Houses with regular, evenly spaced sets of roof-supporting posts, and thereby without modular arrangement in the living area, were very rare at all the settlements. They appear to belong to the latest part of the settlement and so this trait is probably chronologically significant. However, when longhouses with less than two variables were excluded in the final analysis, only one of the remaining longhouses from Nørre Snede had a construction with regularly spaced sets of roof-supporting posts, which led to the automatic exclusion of this variable. But the absolute and the relative spans between the sets of

roof-supporting posts in the living section were other elements that were omitted. When the longhouses are studied, there seems to be a tendency towards a greater frequency of relatively large spans in the room with the hearth in houses in the later settlements. However, on the whole, the size of the span appears to be more dependent on factors other than the chronology, and inclusion in the correspondence analysis apparently did not contribute to emphasising the overall chronological pattern. The other factors that are reflected in the length of the room containing the hearth are possibly of a social character. The architecturally more demanding long spans between the sets of roof-supporting posts could be connected with higher social status and constructional capacity (Herschend 1993). Similarly, the variation in the number of post sets in the living section was probably also primarily socially related, or possibly functionally determined, but it is apparently not chronologically significant.

On the whole, it has proved difficult to find chronologically significant variation in the internal architecture of the living section in the longhouses at Nørre Snede. As a consequence, the living section stands out as one of the most stable elements in the longhouse structure, emphasising the previously noted impression of a strong and maintained norm of spatial organisation throughout the pan of several centuries covered by the chronology.

Absolute chronology

When an attempt is made to attach more exact dates to the chronological house phases, some major challenges are encountered. This is generally due to the very sparse nature of the date-conferring finds recovered from the Late Iron Age settlements. In practice, this means that the pottery often has to stand alone as a reference frame for the relative house chronology (Ringtved 1988). We still lack a sound and robust foundation of radiocarbon dates, sufficient in number and extent to be used as a reliable dating base. The use of the pottery as a basis for dating is also not without its problems and weaknesses. Similarly, the robustness of the pottery chronology can justifiably be challenged when it is transferred from grave finds to the house chronology of the Late Iron Age. The existing pottery chronology is also fairly coarsely meshed and lacks the finer resolution that would be so useful in supporting the relative dating methods. Moreover, Ringtved's pottery chronology does not extend over the entire period covered by the relative longhouse chronology. Her phases a, b, c and d relate to the period from the end of the 2nd century AD until the first half of the 6th century. Consequently, the first decades of phase 1 and all of phases 4a and 4b (Figure 12) are not represented in the pottery chronology, as phase 4a begins around AD 550 and phase 4b ends towards the end of the Late Germanic Iron Age, around AD 700. Nevertheless, it has been necessary to involve the pottery chronology for confirmation and verification with respect to the four main phases evident from the results of the correspondence analysis. As the finds from many of the localities included here were either too few in number or too poorly preserved, the pottery from Nørre Snede provides the background for the dating framework. Accordingly, some adjustments have been made so that the five main phases, which resulted from the analysis of the Nørre Snede longhouses, have now been adapted to the four main phases operated with here.

This means that the chronological house phases lie within the period extending from about the middle of the 2nd century AD to about the beginning of the 8th century AD. Relative to the pottery chronology, phase 1 therefore corresponds to Ringtved's phases a and b, while phase 2 matches with her phase c. Main phase 3, which is divided into 3a and 3b, corresponds approximately to Ringtved's phase d (Ringtved 1988), while main phase 4, as mentioned above, is not covered by

Long house Cronology	Date AD	Period	Ceramical date
Phase 1	150 200 250	Late Roman Iron Age	Ringtved Phase a Ringtved Phase b
Phase 2	300 350	Late Roman iron Age/ Early Germanic period	Ringtved Phase c
Phase 3a	400 450	Early Germanic Period	Ringtved Phase d
Phase 3b	500	(late)Early Germanic Period	Ringtved Phase d
Phase 4a	550 600	Early Germanic period/ late germanic Period	
Phase 4b	650 700	Late Germanic period	

Figure 12. Absolute dates for the chronological phases.

the pottery chronology – or any other form of chronology for that matter. The dates here are based on the late houses at Nørre Snede and their relative position between the other localities included in this study. There is, therefore, despite the challenges inherent in absolute chronology in the Late Iron Age, agreement between the existing chronology and the longhouse chronology. As the relative chronology involves a gradual replacement of the variables, a degree of overlap between the individual phases is naturally to be expected, as these each cover a timespan of about a century and have a more or less equal distribution of longhouses.

While the results of the correspondence analysis make it possible to perform general house-chronological dating, at the same time, they are also testimony to the fact that there is a requirement for a more precise and thoroughly elaborated fine-resolution chronology in this respect. This could be achieved, for example, with the aid of a better artefact typology, probably in particular in the area of settlement pottery, as well as with the aid of a more systematic sampling strategy for the purposes of radiocarbon dating.

Conclusion

To sum up the results of the chronological analysis of the longhouses, it is evident that there is a chronological potential in the remains of longhouses at these Late Iron Age settlements, and at sites with a large corpus of house remains, it is possible to develop a local chronological scheme. It is, however, important to stress that the constructional elements are generally of long duration, there are relatively few chronologically significant elements and the chronologically significant changes are generally minor. At the same time, there are obviously also other factors that influence the layout of the houses, such as social differences, functionality and possibly family traditions. All in all, these characteristics reduce the potential resolution of the chronological scheme and weaken the certainty of the relative dating of the individual houses. Consequently, caution is required in the application of this house chronology.

The chronology scheme of the longhouses presented here is a regional chronology. The aim was partly to attempt to establish a formalised and systematic house chronology, and partly to investigate the degree to which an, in the first instance, very local single-locality chronology for Nørre Snede could be transferred to a regional eastern Jutland perspective. The study has shown that the chronology from Nørre Snede and, not least, the method as an approach are actually applicable. To a very great extent, the data set from Nørre Snede corresponds to those from the other localities in eastern Jutland. Accordingly, the latter reinforce the chronological sequence demonstrated by the longhouses at Nørre Snede. The study has similarly shown that the variables which proved to be chronologically significant correspond, to a great extent, to those variables that have been identified as potentially chronologically significant in general, first and foremost at Vorbasse (Mikkelsen 1988, Hansen *et al.* 1991). Finally, this study and its analyses and outcomes have confirmed that the method used could, with very few adjustments and adaptations, be applied both to an expanded data set and to a data set originating outside the actual region in focus here. Potentially, the method could have a big impact on discussions about continuity versus discontinuity, demographic developments, mobility and relations between sites. Admittedly, there is still room for discussions on the precision of correlation between sites and a better understanding of how specific changes can be identified in the archaeological record.

Notes

1. Houses from the Late Pre-Roman and Early Roman Iron Ages have, to a lesser degree than those of the Late Roman and Early Germanic Iron Ages, been the subject of detailed house-chronological studies (but see Rindel 1999, Haue 2012). This is possibly due to a greater contemporaneous variation in the record and fewer chronologically significant traits in their architecture.
2. The question is perhaps whether this is a true expression of the finds situation or rather the source material's testimonial value?
3. In general, it was a prerequisite that the ground plans of the longhouses were well-preserved and clearly defined.
4. Respectively, BX_52 and BX_46, where BX_46 is the stratigraphically later building.
5. For instance, Lh 100b in phase 4b. Its outlying position in the plot is not necessarily due to a much later date but may be explained by the phenomenon that Lh 100b is the only house in the analysis which only has the occurrence of the variables *gable trench* and *wall trench*.
6. The variable densely spaced wall posts occur in one instance in phase 2 but is otherwise only present in phases 3a, 3b and 4.

7. During the investigation of the Nørre Snede record, the pottery data were subjected to correspondence analysis. The houses in the latest part of the settlement stood out by not having a characteristic pottery assemblage.

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RESEARCH ARTICLE

Borum Eshøj Revisited – Bronze Age monumental burial traditions in eastern Jutland, Denmark

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ABSTRACT

Borum Eshøj is one of the internationally most famous monuments from the Nordic Bronze Age, key to understanding burial customs, social identities and societies. Its uniqueness is reflected in its extraordinarily well-preserved oak log coffin burials, its landscape setting in a distinct barrow group and its complex monumental architecture. Since 1988, new investigations have been conducted at the barrow group, and in 2011, the remains of the classic Borum Eshøj were investigated. The new investigation reveals a monument with an extraordinarily long and complex use-life. It demonstrates a consecutive construction procedure with basic building principles which provide a basis for reinterpreting the barrow and suggesting an initial burial ground compounded beneath one large barrow construction phase. The kerbstones were constructed before the barrow was finished, and the barrow partly covers the kerbstone construction. In a larger perspective, the new investigations indicate that Borum Eshøj, with its construction, use history and kerbstones, stands apart from the investigated local barrows on the Eshøj plateau, and closer parallels barrows situated at much larger distance such as Hohøj in Mariager Fjord.

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1. Introduction

The Danish oak-log coffin burials represent some of the best-preserved archaeological evidence of burial practices as well as contact between different areas and individuals in the Early Bronze Age. Therefore, traditionally, scholars have typically focused on the preserved bodies and the grave goods rather than the context and construction of the mounds. However, unfortunately, thereby a rich and important range of evidence is missed which could potentially expand or challenge existing conceptual models.

Borum Eshøj, east Jutland, Denmark, represents with its three oak-log coffin burials one of these barrows often referred to. And although excavated in the nineteenth century, detailed information exists on its building principles. The validity of these results, however, remained unknown and left a number of critical questions to the interpretation of the construction and architecture of the monument. These questions formed the background for renewed investigations of the classic Borum Eshøj, carried out in the summer 2011 and excavations of the neighbouring mounds conducted since 1988.

The present paper provides detailed new information on the building principles as well as an account of how the new findings relate to previous interpretations, allowing us to present a revised suggestion to the size, the use-life and construction elements of the monument, including its kerbstone construction. Our findings confirm that (1) Borum Eshøj was planned as a large monument from the beginning; (2) based on observations of the kerbstone arrangement, this was probably constructed in the initial stages of the use-life of the barrow and finished before the barrow was fully completed and (3) based on stratigraphic observations of the turf laying, the barrow was erected during one continuous building sequence.

Furthermore, based on construction principles alone, the significance of Borum Eshøj is being compared with excavation results from three barrows in the immediate vicinity of Eshøj (Eshøj II, III and IV) and with present knowledge about exceptionally large barrows from Denmark, especially Hohøj in the Mariager Fjord area and Skelhøj near Kongeåen. A number of parallels can be

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observed across these regions, suggesting very long-ranging personal relations and social networks during funeral activities and barrow-building events in the Early Bronze Age.

2. Research background

Research history

Borum Eshøj (Eshøj I) was an imposing monument before it was demolished. The first accounts estimate its size to about 40 m in diameter and the height to around 9 m, and although this probably included considerable erosion deposits at the base of the mound, it still appears to have been among the largest mounds in east Jutland (Figure 1).

The majority of information about its construction derives from the excavations in 1875, carried out by the Danish National Museum (Engelhardt 1877, Boye 1986 [1896]). However, already ahead of these investigations, the gradual destruction of Borum Eshøj began. In the second half of the nineteenth century, kerbstones from the mound were used for road construction and its soil was used for fertilizing the fields. In 1854, Borum Eshøj was voluntarily scheduled due to the finding of a Late Bronze Age cremation burial, but unfortunately, this protection was not enforced and more of the mound was removed.

Figure 1. The location of Borum Eshøj (Eshøj I) in eastern Jutland, Denmark. The figure was created using ArcGIS 10.4.1© ESRI. The spatial reference is UTM Zone 32, WGS 1984.

In 1871, this led to the first discovery of an oak log coffin containing a woman. The woman was buried with a bronze dagger and several ornaments including a neck ring, arm rings, spiral finger rings, a belt plate, tutuli and a cloth pin. Furthermore, a pottery vessel and organic artefacts, including a wooden box and a comb made of horn, are preserved (Aner and Kersten 2014, No. 6928, p. 222f). Since the coffin was rummaged by the local farmers, it is no longer preserved.

The protection of the mound was annulled and, as mentioned, in 1875, antiquarian excavations were conducted in the central part of the mound, led by C. Engelhardt from the National Museum. This excavation uncovered a further two completely preserved oak log coffins with male inhumations, in addition to another two Late Bronze Age cremation burials and various stone settings (Boye 1986 [1896], p. 49ff.).

The 'old man' reached the age of *c.* 50–60, and at the funeral, he was placed upon a cow skin and dressed in textiles made of wool, and he was also covered with a woollen blanket (Jensen 1998). The only artefact that was discovered, besides the textiles, was a wooden dress pin (Aner and Kersten 2014, No. 6928, p. 221). The coffin is dated dendrochronologically to 1348 BC −10/+18 years (Christensen 2006, p. 195).

The 'young man' reached the age of *c.* 20 and was also dressed in well-preserved woollen textiles and placed upon a cow skin. His grave goods included a bronze dagger in a wooden sword scabbard and several artefacts made of organic materials: a bark box, a horn comb, a dress pin made of bone and a double button made of wood (Aner and Kersten 2014, No. 6928, p. 221f). The coffin is dated dendrochronologically to 1344 BC −11/+18 years (Christensen 2006, p. 195).

In the 1890s, A. Reeh and G. Smith from Aarhus Museum conducted excavations in the southern remaining part of the mound, which did not reveal any burials, and unfortunately, no documentation was left either.

In 1904, a geodesic fixed point was placed in the remaining northern part of the mound. This fixed point preserved Borum Eshøj until it was finally protected by law in 1937. Today, the only thing that is left is this scheduled N–W peripheral

part of the mound with a ground plan of 15–20 m and a height of 5–6 m. Recently, a thorough juxtaposition of the research history and a presentation of all the finds from Borum Eshøj were published as part of the 'Die Funde' (Aner and Kersten 2014, No. 6928).

The 1875 excavation

The original excavation drawings from 1875 suggest a complex picture of the barrow in terms of the use-life of the monument, the excavated area, the stage of preservation and its various components according to their character, age and placement within the monument (Figure 2). The inhumation of the 'old man' was placed at the centre of the barrow and finds of chips of wood show that the coffin was carved from the oak trunk on the spot (Boye 1986 [1896], p. 56).

Besides the three famous inhumation graves, the excavation plan suggests a considerable complexity in terms of the history of the monument, the various activities and structures within the excavated area and the formation processes influencing the preservation.

According to Engelhardt's excavation, a number of structures were uncovered within and underneath the mound. The stone settings at base level are marked with blue. Furthermore, the three Late Bronze Age burials are marked with red on the 1875 plan (Z, Z^2 and Z^3). Like the burials from the Early Bronze Age, the burial equipment from these secondary period IV burials found in the periphery of the mound was unusually rich, containing

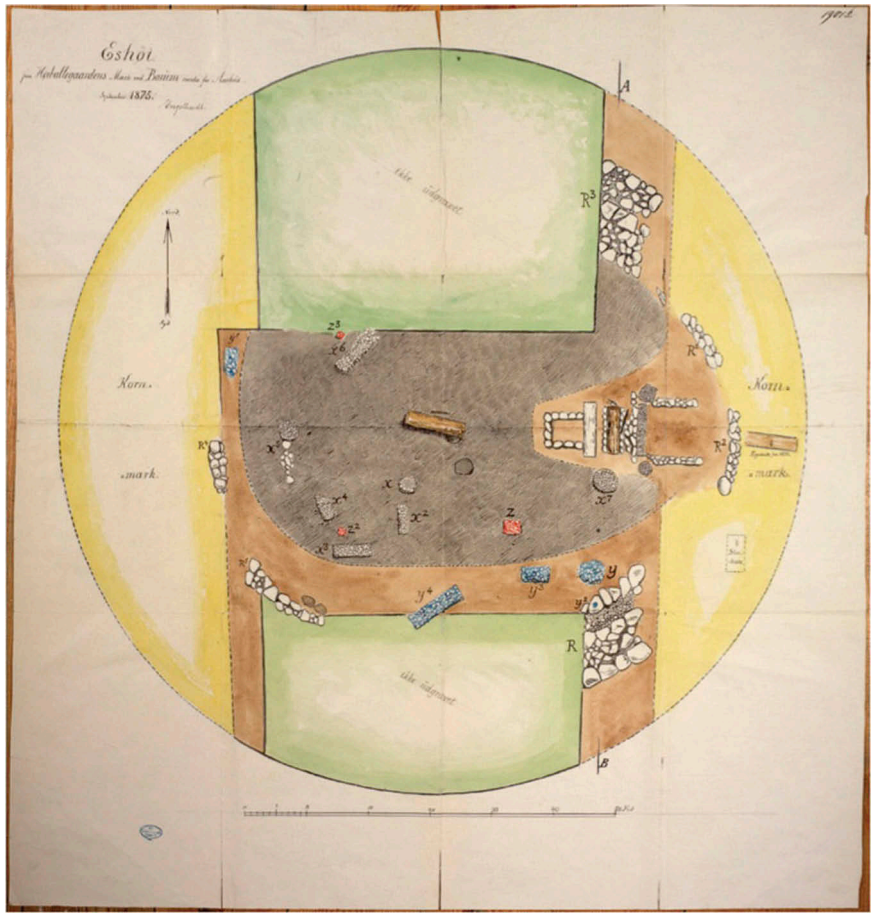

Figure 2. Borum Eshøj (Eshøj I) based on the excavations in 1875 led by C. Engelhardt. The excavation plan was made by J. Magnus Petersen and dated 17 September 1875. 'E' refers to the waterlogged barrow core with turfs containing well-preserved plant remains and 'F' refers to the dry part of the barrow. The exact location of the woman's burial (marked with a C) is uncertain, as it was found before the antiquarian excavation. The burial of the 'old man' is marked with an A and the burial of the 'young man' is marked with a B. The yellow areas are cornfield. The green area at the bottom of the plan was excavated by A. Reeh and G. Smith from the museum in Aarhus in 1891. The northern green area is the peripheral remaining part of the original barrow which was scheduled in 1937. Drawing by Magnus Petersen.

different gold thread decorated bronze items (Engelhardt 1877, Boye 1986 [1896], p. 49, Aner and Kersten 2014, No. 6928, p. 223).

The identified structures at base level consist of various forms of stone paving and structures underneath the barrow, whose functions were generally unidentified during excavation. Judging from the size and shape, some of them may well have been unrecognized burials, while others may belong to other structures associated with the burial activities. This applies to the square stone structures which are situated in relation to the burial of the 'young man'. Similar structures in the form of so-called cult houses have been found outside a number of barrows and are thought to be associated with secondary burials from the Late Bronze Age (Nielsen and Bech 2004, Hornstrup 2005). However, examples of comparable structures which are stratigraphically related to the Early Bronze Age barrows are known from Jægerspris (Lomborg 1957, Aner and Kersten 1973, No. 111, p. 28ff.) and Hüsby (Aner and Kersten 1978, No. 2362, p. 124ff., Rasmussen 2015). Furthermore, the massive kerbstone arrangement, which is partly shown on the excavation plan, gives the barrow a very characteristic look.

Issues of construction and use

One hundred and forty years after the completion of the initial excavation, Borum Eshøj is still a key site for the understanding of Bronze Age people, communities, clothing and burial customs (e.g. Broholm and Hald 1940, Broholm 1943, p. 98, No. 789–91, Munksgaard 1974, Boye 1986 [1896], p. 49ff., Jensen 1998, Randsborg 2011, Bergerbrant *et al.* 2013). Its importance is based largely on the discovery of the three oak log coffins with their preserved garments and grave goods. The complex history of the monument has been given less attention but raises a number of particularly significant themes.

First, the excavations hint at a highly complex construction and use-life of the barrow. From the plan, it seems as if all the different features – the three coffins, the kerbstone arrangement and the wide range of stone settings – are situated at the old land surface level, indicating that a whole cemetery may have been covered in period II by the large barrow construction (Holst 2013a, p. 77). Furthermore, a Late Bronze Age phase is suggested by the presence of several secondary cremation graves. However, it is not exactly clear where the Late Bronze Age burials were found vertically in the barrow, neither is it clear whether these graves belong to a separate phase in the construction of the barrow. The in many ways informative excavation plan therefore raises a series of questions in relation to the use-patterns and constructions.

Second, the extensive kerbstone arrangement, which according to the original documentation surrounds the barrow, is an unusual construction.

South Scandinavian Bronze Age barrows almost always have some kind of demarcation of their boundaries, which is often in the form of different kinds of kerbstone arrangements. The character and size of the kerbstones can vary considerably from one barrow to another – even among monuments that are closely situated (Holst 2013a, p. 69). The activities and functions of the kerbstone area are, however, relatively unexplored. At some barrows, the kerbstone arrangements were possibly erected as a kind of initial demarcation of the monument and the burial ground before the construction of the mound (Boye 1986 [1896], p. 49ff., Goldhahn 1999, p. 194ff., 2016, Bech 2003, p. 162ff., Holst 2013a, p. 69). This interpretation was also proposed for Borum Eshøj by V. Boye. In any case, the comprehensive kerbstone circle which, according to the original documents, originally surrounded the mound is an unusual design. This is due to the form of stone walls of large stones combined with stone pavings with smaller stones in between (Figure 2). However, the documentation seems to some degree idealized, and the actual character seems unclear.

In this way, the original drawings reflect a diachronic complexity which does not seem to be fully understood. The excavation was carried out at a time in which the attitudes within the discipline towards documentation and interpretation of Bronze Age objects had yet to come into its own. Furthermore, the primary focus of the first excavation on the site was on the discovery of material rather than context. These questions and uncertainties motivated the excavation of Borum Eshøj and its surrounding barrows, commencing in 1988 and finishing with the excavation in 2011, which will be presented in the following section.

3. The Eshøj plateau

Borum Eshøj is situated near Højballegård in Borum parish west of Aarhus, in a typical east Jutlandic hilly terrain characterized by clayey Weichsel moraines.

The barrow is situated 104 m above sea level at the centre of a long 4 km^2 plateau, stretching in an N–S direction, enabling a more than 25 km panoramic view on a clear day.

Information from the Danish Sites and Monuments Register, combined with systematic reconnaissance and investigation of aerial photographs, has shown that the Eshøj plateau originally hosted at least 25–30 other barrows[1] forming a distinct barrow group. Today, the barrows have either been ploughed over or removed due to excavations. The known burials from the barrows at the Eshøj plateau are primarily from the Bronze Age, but Iron Age burials are also known (Aner and Kersten 2014, Nos. 6926 and 6927).

Several pollen samples were obtained in connection with the 2011 excavations, but due to the state of preservation on the outside of the mantel core, not all of the samples were analysable. Two of the samples were analysed in order to give an impression of the immediate landscape surrounding the monument. One of the two pollen samples was taken in the ditch under the modern dyke west of the excavation. The sample was obtained from an old surface beneath the eroded barrow soil and thereby represents the landscape from before the erection of the barrow. The analysis showed a rich combination of herbs and dwarf shrubs, indicating an open landscape with heather heath but no immediate indication of grazing. Another analysed pollen sample was taken directly beneath the iron pan in the upper level of the barrow and thereby represents the turfs directly used in the barrow construction. The analyses indicate that the turfs have been obtained from undrained pastures with a very significant indication of grazing. Such a landscape would not have immediately surrounded Borum Eshøj but have been found at some distance from the marked plateau (Enevold 2011).

Besides, the Eshøj plateau shows chronologically and spatially scattered activity traces, which have been obtained from various untargeted and random development-led excavations. They consequently give a very unsatisfactory picture of the area from before and after the erection of the monument. However, a house from the Late Neolithic has been discovered immediately east of the barrow. Traces of activity from the earliest Bronze Age, such as pits and postholes,[2] similarly appear within a few hundred metres of the monument (Figure 3a). These could be contemporary with the barrow construction; however, the character of the archaeological traces has not been uncovered and registered sufficiently to establish any further connection. Furthermore, north of Borum Eshøj several concentrations of Early Iron Age activities have been discovered, primarily in the form of pits and concentrations of postholes with ceramic sherds dated to the pre-Roman Iron Age (500–1 BC). At the SE edge of the plateau in the forest of Vindskov, a Celtic field system, which could have been in use at the same time, is still observable on LiDAR images.

4. The new investigations

Eshøj II–IV

Aim

In 1988, Moesgård Museum commenced a research, training and communication project in relation to the group of ploughed-over barrows from EBA, which are located in close proximity to the scheduled Eshøj I (Borum Eshøj) (Figures 3a and 3b). The three barrows and Eshøj I are situated within a distance of about 300 m, and during the years 1988–1992, they were excavated under the names of Eshøj II (Aner and Kersten 2014, No. 6929, p. 224), III (Aner and Kersten 2014, No. 6931, p. 227) and IV (Aner and Kersten 2014, No. 6930, p. 226). The investigations were carried out primarily by volunteers and amateur archaeologists, attendees at archaeological courses and pupils from the local school in Sabro. The aim of the excavations was partly to obtain knowledge about the neighbouring barrows to Eshøj I, which were threatened by cultivation, and partly to be able to communicate the Eshøj I finds and the area in a more detailed way to the public.

Method

The whole barrow of Eshøj II, except the N–W quadrant, was investigated, whereas in the case of the other two, Eshøj III and IV, the entire barrows were excavated. Subsequently, all three barrows were reconstructed at the same spot using the fill from each, respectively.

Results

Eshøj II. In 1918, the diameter of this ploughed-over barrow was estimated at 27.5 m and the height at 1.90 m. It is situated approximately 100 m east of

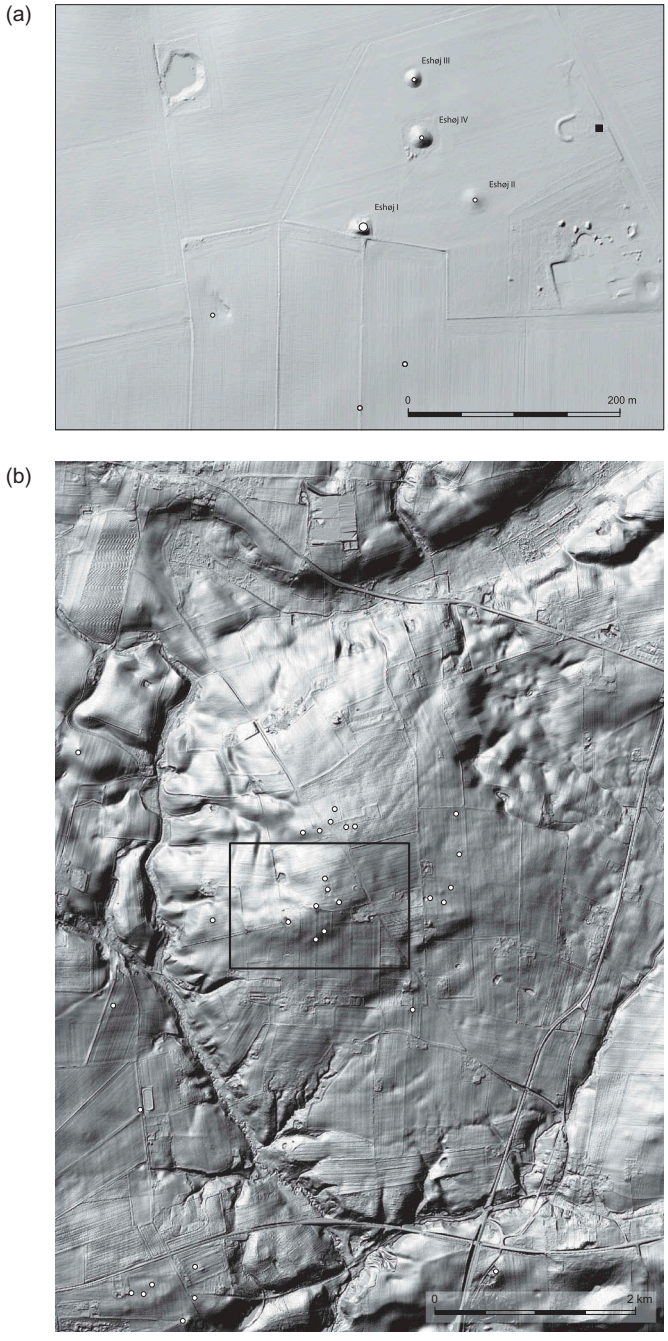

Figure 3. (a) A detail of the Eshøj plateau showing the focus area of this paper (Eshøj I, II, III and IV). White dots refer to barrows that are registered in the Danish Sites and Monuments Register (Fund and Fortidsminder). The black square is referring to pits and postholes from the earliest Bronze Age. Graphics: Mette Løvschal and Casper Skaaning Andersen. (b) The Eshøj plateau. White dots refer to barrows that are registered in the Danish Sites and Monuments Register (Fund and Fortidsminder). Graphics: Mette Løvschal and Casper Skaaning Andersen.

Eshøj I and was a natural starting point for the investigations in 1988. Thus, already in 1959, a young school boy made some trenches in the barrow and found parts of a sword, a wooden scabbard, a belt hook ornamented with spirals (EBA Per. II) and a flanged axe (EBA Per. I) (Aner and Kersten 2014, No. 6929, p. 224f). The museum stopped the illicit dig and in cooperation with the boy, the find places were marked, the trenches into the barrow were documented and covered and the artefacts were delivered to the museum.

The 1988–1991 excavation uncovered two inhumation graves from period II; one was found a bit south of the centre of the barrow at the finding place of the 1959

artefacts (Figure 4). The oak log coffins found in Eshøj I only had a few stones to support them. This burial, on the contrary, appeared as a comprehensive E–W-oriented stone packing (3.6 m long and 2 m wide), surrounding an empty burial pit (2 m × 0.6 m) where the dissolved coffin had originally been placed (Figure 4, grave A). Small pieces of enamel of teeth were the only remains of the buried individual, but the finding of more pieces of the sword and a fibula indicate (together with the belt hook) that a male was buried here.

The other inhumation grave (Figure 4, grave C) was found north of grave A and at a higher level (approximately 1 m above grave A). The burial appeared as an E–W stone packing of two parallel stone rows which presumably originally supported an oak log coffin. No traces of the buried person were left, except an armring indicating a female burial from per. II. The flanged axe found in 1959 at the N–W corner outside of the comprehensive stone packing of grave A (Figure 4, No. B) is typologically older than the artefacts found in the inhumation grave and might be interpreted as an older destroyed grave or as a kind of deposition in relation to grave A.

A Late Bronze Age urn grave (LBA Per. IV/V) (Figure 4, grave D) contained a small collection of burnt bones and indeterminable pieces of bronze. It was set in a stone frame and covered by a packing of smaller stones. A Late Bronze razor (LBA Per. IV/V) and another stone structure presumably also represent destroyed cremation graves (Grave E not marked on Figure 4 and No. F). The barrow was constructed upon a system of ard furrows; several flint artefacts (sickles, knives and daggers) and ceramics were found in the barrow fill (Aner and Kersten, No. 6929, p. 224 ff.).

The excavations did not reveal any identifiable traces of a demarcation by kerbstones (Aner and Kersten 2014, No. 6929, p. 224f). However, dispersed smaller stones in front of the barrow may be part of a destroyed stone paving, allowing an estimate of the original diameter of the mound of around 19–20 m.

Eshøj III. In 1918, the diameter of the ploughed-over barrow was 18.25 m and the height 1.20 m. The barrow is situated approximately 150 m N–E of Eshøj I, and the investigation of the barrow began in 1989 and

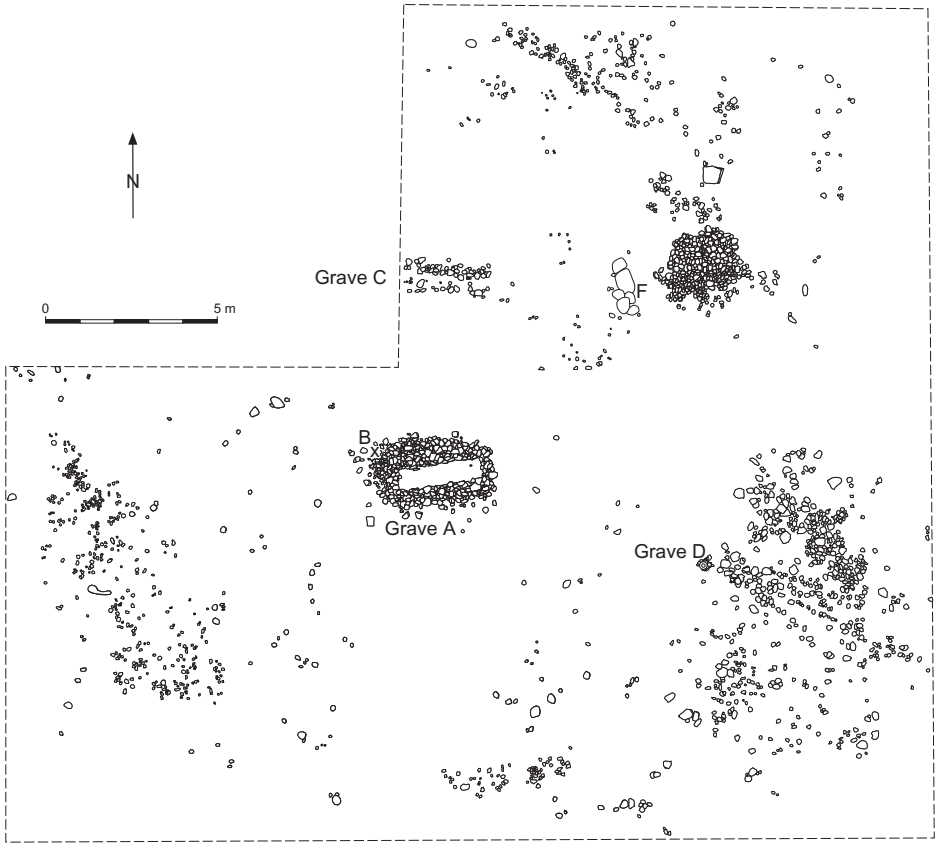

Figure 4. Eshøj II excavated in 1988–91 (from: Aner and Kersten 2014, 224, Abb. 163, with permission from Project Coordinator, Thomas Hjejle Bredsdorff, the National Museum, Copenhagen). Graphical changes made by Ea Rasmussen.

continued until 1992. The remains of one inhumation burial were found at the centre of the barrow (Figure 5, grave A), consisting of an E–W-oriented stone packing of two parallel stone rows, which originally was supporting an oak log coffin of which only vague traces were left. However, no traces of the buried individual or grave goods were found. Like Eshøj II, the barrow was constructed upon a system of ard furrows (Aner and Kersten, No. 6931, p. 227).

The demarcation at Eshøj III consisted of an almost intact surrounding wall of large kerbstones preserved in up to three layers. In front of this wall, the fragmentary remains of a possible two further rows of large stones, separated by an interval of up to 1.5 m, were uncovered (Aner and Kersten 2014, No. 6931, p. 227). The interior measure of the kerb was 20–22 m in diameter.

Eshøj IV. In 1918, the diameter of the ploughed-over barrow was 23.5 m and the height 2.20 m. The barrow is situated between Eshøj III and Eshøj II, approximately 125 m N–E of Eshøj I; the investigation of the barrow began in 1990 and continued until 1992.

The central part of the barrow had been disturbed by plundering. A few burnt bones were found in the disturbed fill, indicating a destroyed cremation grave. Otherwise, the traces of one inhumation burial were found a bit north of the centre of the barrow (Figure 6, grave A). Only a few stones supported the oak log coffin of which a few centimetres were preserved. Neither trace of the buried individual nor grave goods were found. However, one wooden artefact (presumably a handbarrow) found in the barrow fill probably relates to the carrying of the turfs and in that way to the construction of the barrow.

The northern part of the barrow was partially constructed upon a Late Neolithic two-aisled longhouse measuring 19.4 × 6.5 m (2000 BC)[3] (Heinemeier 2002, p. 286) further; several presumably related cooking pits and scattered traces of ard furrows were observed.

The barrow is surrounded by a distinctive kerbstone arrangement which consists of a circle of large kerbstones and features a stone-paved collar-like platform with stones in 1–3 layers on the inside and a large stone paving up to 3 m wide in front. Some of the large kerbstones measure 60 × 40 cm. Furthermore, several stone settings appear to be placed on the outside of the foot of the barrow (Aner and Kersten 2014, No. 6930, p. 226f). The circle of large kerbstones measures 20–21 m in diameter.

Eshøj I (Borum Eshøj)

Aim

In 2011, a new excavation was commenced of selected parts of the remains of Eshøj I (Borum Eshøj).[4] The aim of the 2011 excavation was to provide a better basis

Figure 5. Eshøj III excavated in 1989–92 (from: Aner and Kersten 2014, 226, Abb. 165, with permission from Project Coordinator, Thomas Hjejle Bredsdorff, the National Museum, Copenhagen). Graphical changes made by Ea Rasmussen.

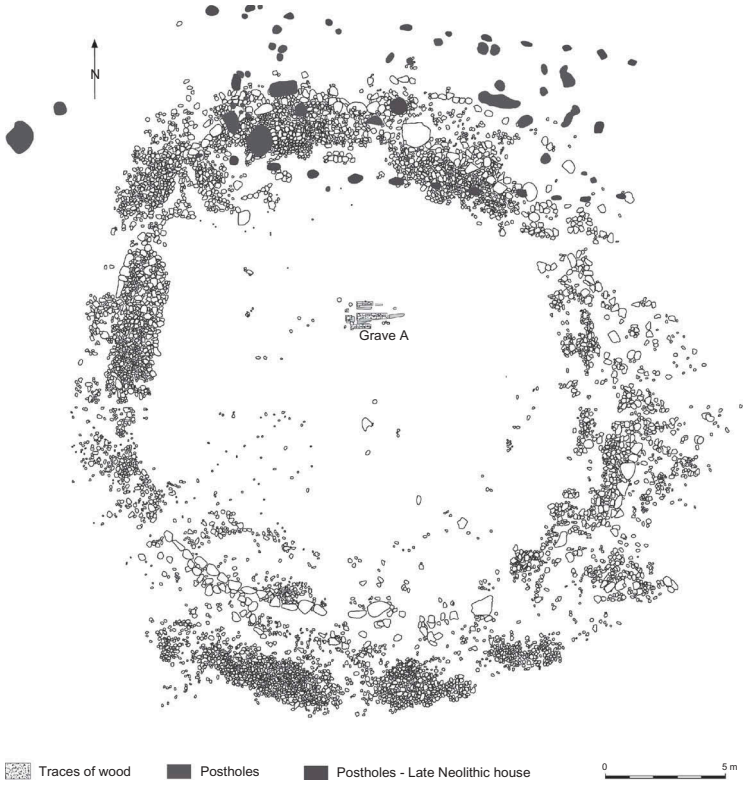

Figure 6. Eshøj IV excavated in 1990–92 (from: Aner and Kersten 2014, 225, Abb. 164, with permission from Project Coordinator, Thomas Hjejle Bredsdorff, the National Museum, Copenhagen). Graphical changes made by Ea Rasmussen.

for the interpretation of the original documentation, including the location of the original excavation fields and the comparison of the nineteenth-century studies with modern, interdisciplinary analyses and detailed context documentation (Thrane 1984, Breuning-Madsen and Holst 1998, Holst *et al.* 2001, Bech 2003, Holst and Rasmussen 2013). As mentioned, the investigation was particularly focused on a series of specific questions relating to the history of construction and use of the monument. They were carried out as a collaboration between the section of Archaeology at Aarhus University, Moesgaard Museum and the Danish Agency for Culture – partly as a preliminary initiative in connection with the national project: 'Danmarks Oldtid i Landskabet',[5] partly as training excavations involving a team of BA students and later a team of PhD students from the Forging Identities project (Vandkilde 2015).

Method

The intention with the new excavation was initially to use a mechanical excavator to make a diagonal removal of the bioturbation zone from the western part of the remaining barrow. However, it turned out that this topsoil layer was thicker than expected and that the observation conditions were poor. Therefore, we decided to move directly on to a levelled, partly mechanical partly manual, removal of soil and to establishing different sections, plans and balks to be able to observe the turfs, the iron pan etc. from different angles (Figures 7 and 8). Furthermore, a narrow test trench was dug to the west of the barrow in order to be able to document the extent of the barrow as well as other elements from the different stages of the use-life of the barrow, such as ard marks, posts, stones, pits etc. An E–W-oriented cross-section was established at the southern side of this section. The main effort was aimed at sections and plans, and at the kerbstone arrangement. Subsequently, the removed fill was used to reconstruct the exposed parts of the barrow.

Results

Barrow construction. The barrow was built of easily recognizable turfs and seems to represent the result of one continuous construction event (Figures 9–11). White water-deposited layers were found, indicating rainfall during the construction period. Still, there are no other indications, such

Figure 7. The excavation of Eshøj I documented in three steps. Photo: Mette Løvschal.

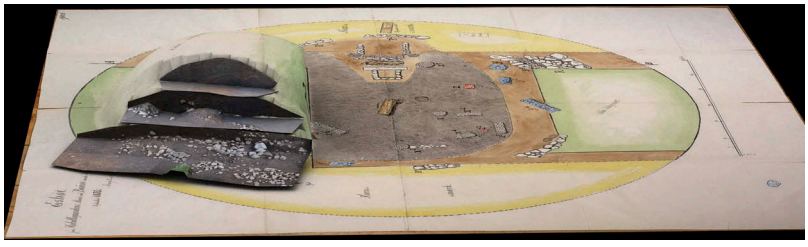

Figure 8. The 2011-excavation of Eshøj I situated in relation to Engelhardt's plan from 1875 (Figure 2) shown in 3D. Graphics: Peter Jensen.

Figure 9. The turf construction, upper level, in Eshøj I. Detail photo: Moesgaard Museum, Peter Jensen.

Figure 10. N–S section of the turfs and kerbstones in Eshøj I related to the three steps (upper, middle and lower). Graphics: Mads Kähler Holst and Casper Skaaning Andersen.

Figure 11. The southern part of the middle step in Eshøj I. The radial sector division (A6) is seen as a sudden shift in fill colour. Traces of the 1875 excavation are seen to the right. The stone row is referred to in the text as A3. Photo: Moesgaard Museum.

as new growth layers, of breaks of any considerable duration in the building process. No indications of barrow extensions that could be assigned to the Late Bronze Age secondary burials could be recognized. It is worth noting that the turf construction of the mound extended past, and thereby covered parts of, the kerb construction. This can for example be observed from the surface documentation in the different steps of the barrow (Figure 12). However, since all the soil

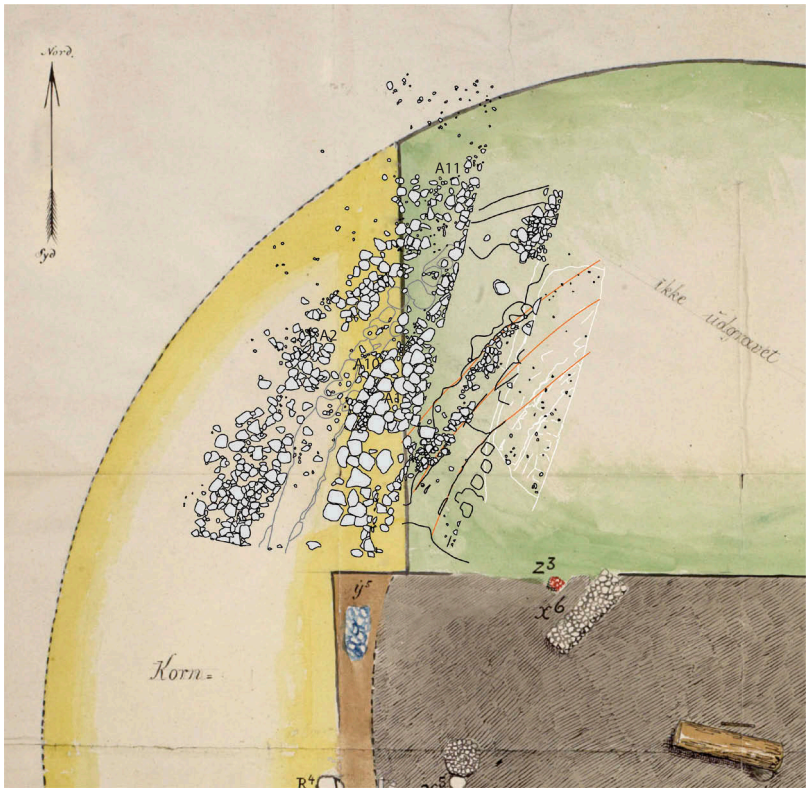

Figure 12. The three steps in Eshøj I with a marking of the different A-numbers mentioned in the text. Graphics: Mads Kähler Holst, Casper Skaaning Andersen and Ea Rasmussen.

situated across the stone arrangements was disturbed, this could not be documented in the sections. The full structure of the kerb thus only appears to have been visible for an intermediate phase during and possibly before the construction of the mound.

As mentioned, the excavation was conducted in the western periphery of the remaining part of the barrow and characterized by many disturbances. However, colour differences in the fill and stratigraphic observations of the turf-laying principles actually made it possible to document that the barrow was constructed of several shells (Figure 11), which, at least in relation to large barrows, seems to be a widespread architectonic principle (Holst 2013b). Three construction stages (A4, A5 and A7) were identified, and seen in conjunction with the observations of the upper iron pan, it could be stated that the iron pan followed the course of the shells (Holst *et al.* 2015, p. 282). Hence, although the level of detail was much less than what was documented the excavated burial mound in Skelhøj near the Kongeå River in southern Denmark (Holst and Rasmussen 2013), this shows that the basic architectural composition of the Borum Eshøj barrow, with successive and encapsulating shells, corresponds to the results from the Skelhøj monument and other large barrows.

Based on the new estimates of the size of the Eshøj I and the average proportions of the turfs, the total turf consumption can be assessed to around 630.000 (Table 1).

Furthermore, one radial sector division (A6) was found, appearing as a boundary in the form of a sudden and distinct radial shift in the fill colour, indicating a shift in turf type. The shift could be followed up through the mound and was also visible in the main section. Radial sector divisions are another part of the organization of large barrow-building principles and might even reflect a division of builders into various working groups, each responsible for separate parts (Holst 2013b, p. 309).

The 1875 excavation was visible too through a sharply defined vertical shift in fill colour in the southern peripheral part of the mound (Figure 11).

Structures of smaller stones were observed in the mound fill near the southern edge of the mound, in the form of a stone row (A3) and a minor stone paving. The structures were embedded in the mound fill, and in this way, they appear to have been established during the construction of the mound. The significance of these structures is unknown, but they could be related to the activities at the kerb and may reflect a form of closing activities near the completion of the mound construction.

The history of the kerbstone arrangement. The observations at the 2011 excavation of the construction stages covering the kerbstones confirm Boye's assumption that the kerbstone arrangement was constructed in the initial stages of the use-life of the barrow and finished before the barrow was fully completed (Boye 1986 [1896], p. 62).

The new excavations also show that the comprehensive kerbstone arrangement had, at least, two different construction phases: a complex inner stone platform construction which was built up of several layers of stones, and an outer, younger stone pavement partly built of plane stones. In profile, it was observed how the stone paving had been built upon eroded soil accumulated at the foot of the outer kerbstones (A1) (Figure 13). Consequently, A2 must have been erected some time after A1, suggesting that the overall kerbstone area would have been replaced or extended.

Due to the disturbances, the kerbstone arrangements appeared at first to be anything but strictly organized. However, when removing all ex situ stones, as well as systematically registering traces of removed stones, the system in the layout was distinct. The structure of the inner kerbstones (A2) corresponds to the general structure of the 1875 plan with three rows of large stones filled up with smaller stones in between.

Table 1. Based on the average proportions of the turfs and the new estimates of the size of the Eshøj I, the total turf consumption can be assessed to *c.* 630,000 sods (calculations made by Mads Kähler Holst). Compared to diameters and heights of Eshøj II, III and IV.

No.	Name	Average diameter[a] (m)	Height (m)	Average sod thickness (m)	No. of sods[b]	Netto area of sod stripping (m^2)
AK6928	Eshøj I	27	9	0.06	627.964	659.362
AK6929	Eshøj II	20	>2			
AK6931	Eshøj III	21	>1			
AK6930	Eshøj IV	20	>2			

[a]Estimation based on Eshøj I, WNW–ESE dia: 28.5 m, SSW–NNE dia: 26 m; Eshøj II, E–W dia: 1 m, N–S dia: 20.3 m; Borum III, E–W dia: 22 m, N–S dia: 21 m; Eshøj IV: WNW–ESE dia: 21 m, SSW–NNE dia: 20 m.
[b]Estimation based on an average size of 0.30 m × 0.35 m – pointed oval shape.

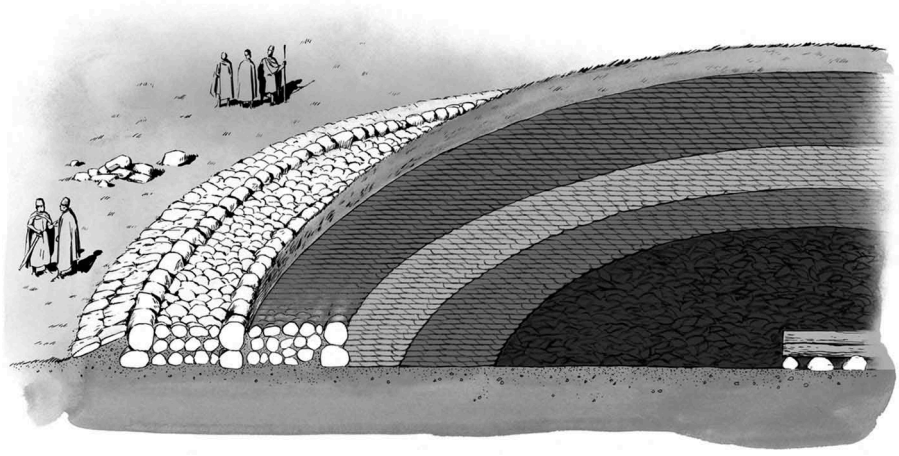

Figure 13. Reconstruction of the barrow based on the new excavations from 2011. Drawing: Sune Elskær and Slots-og Kulturstyrelsen.

The innermost row of large stones actually takes the form of a stone wall of up to three courses of stones. The stone paving in both the inner and the outer kerbstone arrangements appears to have been built in several courses, which in some places appear to have been held together or supported by smaller stones and subsoil material with a loamy-sandy texture.

There are different activity traces associated with both the inner and outer kerbstone area. As part of the inner kerbstone arrangement, a stone with a cup mark was found, and in connection with the outer kerbstone arrangement, a layer of burnt charcoal (A11) has been observed (Figure 12). This charcoal area was partly covered by the stone arrangement, indicating stratigraphically older activity in relation to the kerb area.

5. Discussion

The biography of the site

Comparing the above observations from the new excavations with Engelhardt's drawing, a new picture of the construction elements and use patterns of the site and its immediate surroundings can be suggested (Figure 14).

The earliest identifiable activity in the area is the Neolithic house structure underneath Eshøj IV, which also appears to represent the latest settlement activity on the Eshøj plateau. This settlement phase was probably replaced by a phase in which the area was reworked to ploughing, evidenced by the buried A-horizon underneath Eshøj I. The chronological relationship between the house and the cultivation layer is unknown; yet, it is not unlikely that ploughing took place shortly after the house was abandoned as part of a general use pattern where people utilized the fertile soil (Rasmussen 1995).

Next, an Early Bronze Age area of activity can be recognized, including a group of pits found east of the barrows.[6] The pits are situated at the periphery of the area of the Eshøj barrows (Figure 3a), and only a small part of this area has been thoroughly excavated. Therefore, it is not clear whether these features are related to a settlement area or if they might be more closely associated with the barrow-building and presumed rituals associated with it.

Pollen analysis from Eshøj I demonstrates that the landscape prior to the barrow-building was characterized by open vegetation dominated by heather and grassland (Enevold 2011).

The barrow-building related to Eshøj I represents an extremely complex construction. The full extent of the barrow was probably laid out at a very early stage, demarcated by the complex inner stone platform construction of the kerbstones, indicating that the barrow was planned to obtain its large dimensions from the very start.

According to the finds and the drawing from Engelhardt's excavation in 1875, Eshøj I is an example of a barrow erected over several burials during one continuous building sequence. The two dendrochronologically dated coffins (the two men) seem close together in time, while the dating and find circumstances of the woman's coffin are unknown. Moreover,

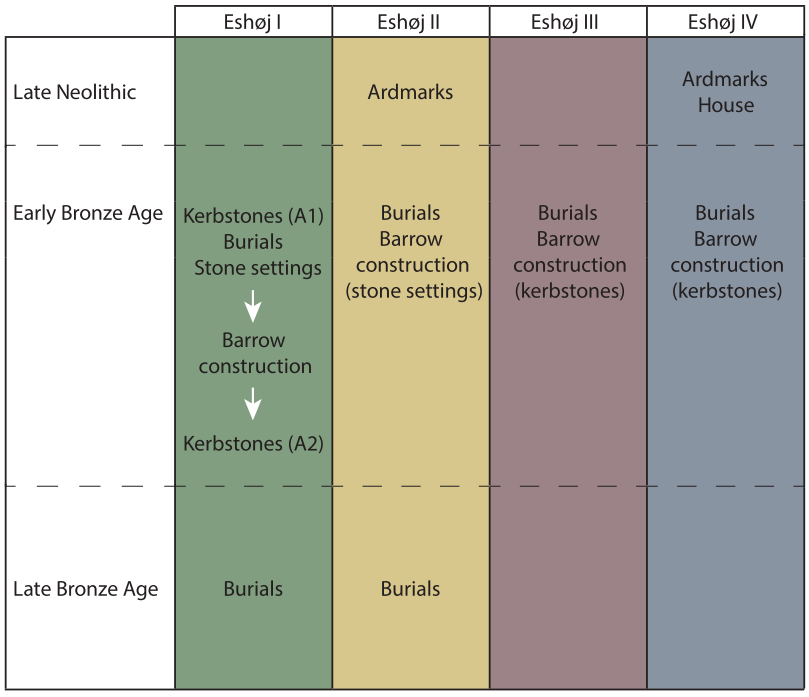

Figure 14. Relative chronology of Eshøj I and its immediate surroundings. Graphics: Mette Løvschal and Ea Rasmussen.

the precise year of felling is not completely clear (Christensen 2006, p. 182f). However, due to the varying dates and the numerous activity traces in the form of stone structures, it seems likely that we are dealing with structures accumulated over some years. Hence, the extremely well-preserved Eshøj I burials must necessarily have been covered at least by some kind of shielding, possibly in the form of smaller mounds like the situation from the later Bronze Age barrow Lusehøj on Funen (Thrane 1984): see also examples from Sweden (Lundborg 1972, 67ff.).

The central burial (the old man) was presumably the initiating factor for the construction, and the remaining stone structures and burials may either have been there already or established during the construction of the mound.

Even if the construction of the covering barrow took place in a continuous sequence, the find situation therefore indicates a form of cemetery-like use pattern, having presumably for some years served this purpose in relation to the different burial activities and finally – still during period II – been covered by the barrow (Holst 2013a, 77ff.).

The covering mound was constructed as a series of turf-built shells which were added in a continuous workflow, and at present, nothing speaks against one complete construction phase. The adding of the shells did not stop by the foot of the stone setting but partly covered it. Finally, maybe at the same time or maybe several years after, another narrow stone setting was added to the foot of the barrow, where traces of burning have also been discovered (Figures 12 and 13).

The exact chronological relationship between the different monuments in the barrow cluster of which Borum Eshøj forms part remains an open question. The oldest known burial is the period I burial in Eshøj II. Graves from Eshøj II have been dated to period II, and Eshøj III and IV could also have been established in period II. Hence, the barrows appear to have been constructed within the same 200-year period as Borum Eshøj.

Their close proximity in both time and space suggests that, in period II, a fairly large area became dedicated to barrows and the building of barrows after period I. Centuries later, the Borum Eshøj I was used as a repository for several LBA cremation graves. Late Bronze Age burials are also known from Eshøj II.

Barrow traditions near and far

In a larger perspective, the construction of Borum Eshøj was part of a noticeable boom in the building of large round barrows in southern Scandinavia from *c.* 1450 BC, probably spanning one or two

centuries (Holst 2013a, 42ff.). The barrow-building events involved turfs stripped from several hectares of the immediate surroundings of the barrows and thus made an extensive visual and economic change of the landscape for the generations to come (cf. Doorenbosch 2013).

The barrow-building events also had wider social consequences (Holst and Rasmussen 2012). By participating in the barrow building, people were part of a dynamic platform which secured the recurring renegotiation and maintenance of new and existing labour divisions and social relations. These relations became physically elaborated and materialized in the highly segmented architecture of the barrow.

It has recently been suggested that people could have travelled extensive distances in order to participate in funeral activities and barrow construction events in the Early Bronze Age (Jockenhövel 1991, 2011, Bergerbrant 2007, p. 119ff., Holst and Rasmussen 2013). Considerations of long-distance funeral networks are most often based on studies of the material artefacts and exceptionally rich grave goods (Thrane 1984, p. 17).[7] Lately, similar suggestions have been made but on the basis of the efficient dissemination of barrow-building knowledge (Holst and Rasmussen 2015, p.127ff.). A successful barrow construction would have been determined by people's initial knowledge of physical and ideologically associated construction principles, a relatively precise and discursive definition of labour, knowledge of how to move around on the construction site. The barrows indexed a particular spatial structure and order through which different social segments and orders were regenerated. In this way, the barrow itself became a physical manifestation of the long-distance networks and social ties associated with both the deceased and the people involved in the barrow-building event.

The 2011 excavation of Borum Eshøj provides further perspectives by adding the complex architecture and construction sequences as possible elements that linked together the exceptionally large barrows across long distances.

Hohøj in north-east Jutland

Hohøj is considered to be the largest Early Bronze Age barrow in southern Scandinavia. It is situated east of Mariager in north-east Jutland, *c.* 48 km as the crow flies from Borum Eshøj. Hohøj is situated on a 110-m high hill and is considered to have been originally 12 m high and 72 m in diameter, including subsidence and erosion deposits around the base.[8] Similarly to Borum Eshøj, it has a long history of destruction but was partly excavated in 1997 (Bech 2003). The excavation revealed a number of similarities between the two barrows.

The original construction of Hohøj took place as several (six or seven) succeeding sequences of shell adding (Figure 15). The shells were each constructed with long strips of turf, which had been laid down systematically in horizontal sequences. Geoprospection investigations indicated the possible existence of two smaller mounds encapsulated by the barrow. The sequences of shell adding would have been interpreted as being part of one cohesive barrow-building event, which could have extended across a very long period without any significant standstills. In the earliest phase of Hohøj, a stone wall is believed to have been the first

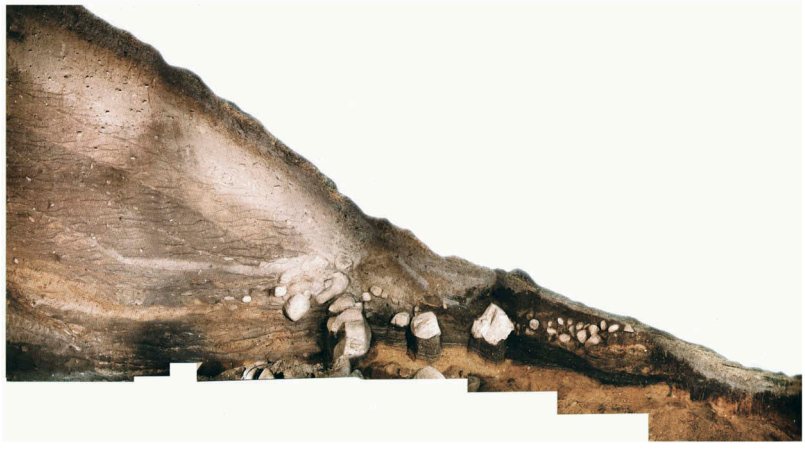

Figure 15. East section of Hohøj, northeastern Jutland, Denmark. Graphics: Karsten Kristiansen.

Figure 16. Hohøj's kerbstone arrangement seen from North. Photo: Museum Østjylland.

fundament of the barrow and originally more than 1 m high. The stone wall was braced by an outer stone wedge, which would have supported the subsequent fill within the stone wall. Yet, another two stone rows of large stones encircled the foot of the barrow, *c*. 1 and 1.5 m from the stone wall. The two stone rows are separated by a kern ditch and had been added, partly, on top of the stone wedge (Figure 16). Furthermore, the adding of turfs can be observed as overlying the stone wall and wedge, thus entirely encapsulating the various stone constructions as is the case at Borum Eshøj.

In this way, there are certain conspicuous coincidences between the two exceptionally large Early Bronze Age barrows, Hohøj and Borum Eshøj, in their complex sequential construction and outer kerb ring construction. In both cases, the barrow-building event appears to have covered *one* coherent set of consecutive procedures. In both cases, an inner kerbstone setting and/or stone wall appear to have been used as the first marking of the burial area as well as a demarcation of the expected extent of the barrow. And in both cases, this has been succeeded by yet another stone arrangement which further increased the extent of the barrows. These characteristic elements did not only make the two barrows at Borum Eshøj and Hohøj extraordinary in size but also suggest that a very specific knowledge of components and procedures was coupled with a particular large-scale building tradition.

At the same time, their basic constructional elements differed in significant ways from other contemporary adjacent barrows. The three excavated barrows on the Eshøj plateau, Eshøj II–IV (cf. section: 'The new investigations'), were all constructed with kerbstone settings with remarkable deviations in layout (Figure 4–6). One was constructed of large stones (III); another was constructed with a clear kerbstone arrangement and stone pavement (IV); yet, another had no visible kerbstone demarcation, but several stone pavements. This again differs from Borum Eshøj, where the kerbstone setting was constructed as an inner kerbstone arrangement, built as a platform construction and an outer kerbstone arrangement with predominantly flat stones (cf. 'The history of the kerbstone arrangement'). Thus, although the Eshøj barrows were situated on the same plateau, with very short distances between them, and probably all being built within a short period of time, their kerbstone constructions seem to have been significantly different and hence could refer to different traditions altogether.

Seen in this light, the kerbstone construction surrounding Borum Eshøj appears as a manifestation of a principle whose nearest counterpart is also constructed as an exceptionally large barrow, situated at a long distance from the Eshøj plateau. This suggests that the personal relations and social networks activated during funeral activities and barrow-building events in the Early Bronze Age could have been very long-ranging indeed. And that the barrow-building event and succeeding use played a vital part in the establishment, negotiation and maintenance of social relations (Goldhahn 2008, Holst and Rasmussen 2012). This is further emphasized by the complex construction and long use-life of Borum Eshøj. It would also entail the barrow obtaining the characteristics of a burial site in

the landscape, marked out from the beginning by a kerbstone setting with a significant ritual activity taking place on both inside the enclosure and in direct connection with its boundary before the final sealing. This would have allowed people to travel from afar in order to participate in the funeral activities.

6. Conclusion

In spite of serious disturbances of the barrow, the new investigations of Borum Eshøj have led to new detailed insight into its construction elements and use-life, as well as its surrounding landscape. The results have enabled a reassessment of the excavation plans from 1875 (Figure 2). Although it is unknown whether the stone setting on the old drawing is depicted as a signature, the drawing appears to represent a fairly reliable section of the excavation situation, and an equivalent distinct stone setting was rediscovered in 2011.

First, the new excavations provide the basis for a new interpretation regarding the number of building phases, demonstrating that the barrow was planned as a large monument from the beginning. The stratigraphic observations of the turf laying did not reveal any sign of more than one phase. Second, the new excavations provide new knowledge of the different building practices, which show parallels to Skelhøj in regard to the documentation of construction stages and a radial sector division. Especially the fact that the inner part of the kerbstone area was embedded in the barrow soil shows parallels to Hohøj. Moreover, it was documented that the kerbstone arrangement at Borum Eshøj had, at least, two different construction phases. Third, this indicates that particular connections could have existed between the exceptionally large barrows from the Bronze Age, not only related to equipment in the form of grave goods but also construction elements and practices. Fourth, Moesgaard Museum's previous excavations of other barrows in the vicinity enable the establishment of a comprehensive local context, which is rare in the Scandinavian Bronze Age. These barrows form part of a concentrated area dedicated to the building of barrows, yet displaying a very large dispersal regarding their construction elements.

Notes

1. Aner and Kersten suggest that the number of barrows was rather 40 or more in this area (Aner and Kersten 2014, Tafel 216).
2. Moesgaard Museum, archieve no. FHM3812 site number: 150101-60.
3. Sample: AMS-lab. Aarhus University, FHM3571, MS2, layer b. Charcoal (oak) from central posthole, 3700 ± 50 14C-year BP. Cal. (Struiver *et al.* 1998): 2130–2045 BC/2195 1980 BC (Heinemeier 2002, 286).
4. Moesgaard Museum, archieve no. FHM 5271 site number: 150101-12.
5. (http://slks.dk/fortidsminder-diger/danmarks-oldtid-i-landskabet/om-danmarks-oldtid-i-landskabet).
6. See note, number 2 (FHM3812).
7. For example, Lusehøj on SW Funen has been paralleled with the exceptionally rich central European graves because of its rich grave equipment and imported goods (Thrane 1984, Bergfjord *et al.* 2012).
8. In comparison, the famous *Thyra's Høj* from Viking Age Jelling is 8.5 m high and 65 m in diameter (Magnusen and Thomsen 1973 [1823], Krogh and Leth-Larsen 2007, p. 84).

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RESEARCH ARTICLE

The Maglemosian skeleton from Koelbjerg, Denmark revisited: identifying sex and provenance

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ABSTRACT

The Koelbjerg individual, dated *c*. 8500 cal BC, represents the earliest human skeletal remains described from Scandinavia. Based on ancient DNA, strontium isotope and statistical anthropological analyses the individual's sex, haplogroup and geographical provenance are here analysed and discussed. In contrast to previous claims, our genetic and anthropological analyses show that this individual was a male. Additionally, the strontium isotope ratio of one of his first molars indicates that he most likely grew up locally.

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Introduction

The bones of the Koelbjerg individual from Funen, Denmark (Figures 1 and 2), are the oldest human remains presently known from Scandinavia. For this reason, the relatively intact skeleton has received significant scientific and public attention since it was salvaged during peat digging in 1941; see Henriksen and Hansen (2017), for a brief summary of the earlier studies. The general consensus is that the skull and scattered skeletal remains belong to the same individual. This conclusion is based on the observation that there are no duplicated bones, all the bones have the same colouring and a similar state of preservation, and to the extent that they convey information on the person's age at death, they are in solid agreement. There are therefore no scientific arguments for considering the skeletal parts to represent more than one individual (Bröste and Fischer-Møller 1943, Bennike 1986).

The individual's sex, however, has repeatedly been debated since the first preliminary anthropological analysis of the skeleton. The remains were, with some ambiguity, interpreted as those of a *c*. 155–158-cm tall woman in her 20s, characterised by masculine neurocranial traits (Figure 3), rather androgynous facial features and gracile extremities. The fragmented pelvic bones were, after some consideration, interpreted as that of a female (Bröste and Fischer-Møller 1943, Bennike 1986).

The dating of the Koelbjerg skeleton was for decades based solely on pollen analyses, which indicated that it belonged in an early stage of the Early Holocene when birch and pine forests had already covered the moraines of the latest Ice Age, and shrubs of hazel began to spread across the landscape (Troels-Smith 1943). This pollen date has more recently been accompanied by two radiocarbon dates, both based on the right femur: K-4063, 9250 ± 85 BP and AAR-8613, 9285 ± 50 BP (Tauber 1986, Fischer *et al.* 2007, Henriksen and Hansen 2017). Calibrated to calendar years, these dates show that the skeleton is *c*. 10,500 years old and thus belongs to the early stage of the Maglemose Culture. Apart from the Koelbjerg skeleton, this period (*c*. 10,500 BP) is yet only represented in the local archaeological record by a few single finds, as the majority of Funen finds from the early Maglemosian period are estimated to be younger than the skeleton from Koelbjerg, Figure 4 (Henriksen and Hansen 2017).

In Denmark in general, contemporaneous settlement assemblages etc. are well known, however,

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Figure 1. Northwestern Europe *c.* 10,500 BP. The star marks the Koelbjerg find (Graphic: Simon Nissen; based on Moree and Sier 2015).

exemplified by the habitation site of Barmose (Johansson 1990), and the aurochs' skeleton from Vig, penetrated by flint projectile points (Fischer 1996), both found on present-day Zealand.

New technologies provide the opportunity not only to venture into new research areas but also to revisit old unresolved questions, and the Koelbjerg skeleton is no exception in this respect. In 2000, researchers from the Institute for Zoology and Anthropology, University of Göttingen, Germany, sampled material from the Koelbjerg skeleton's rear molar in the lower jaw (right side), and two samples from, respectively, the upper and lower part of the right femur, in order to test for DNA preservation. However, the technology available at the time failed to produce evidence of authentic ancient DNA in the samples. The analyses were therefore concluded with a short report (pers. comm. S. Hummel) to Odense City Museums that offered no clear results.

Over the last couple of decades, a number of scientific methods have been introduced, prompting new and exciting opportunities in archaeological research. Several of these technologies have the potential to settle the controversies surrounding the Koelbjerg skeleton. Next-generation sequencing, for example, has revolutionised molecular biology including the field of ancient DNA, making it possible to sequence many millions of DNA fragments in parallel. Importantly, this technology also allows for the sequencing of very short DNA fragments, which is crucial when working with highly degraded ancient DNA (e.g. Allentoft *et al.* 2012). Similarly, methodological improvements in the field of strontium isotopic tracing have provided important information on individual mobility (Haak *et al.* 2008, Frei *et al.* 2015). DNA and Sr are excellent complimenting information, not comparable but instead giving each other context, with DNA showing heritage (genetic ancestry) and Sr geographical location, that is, where a person actually lived. Osteological methods for sex estimation have steadily improved since the first thorough measuring and publication of the Koelbjerg skeleton conducted by Bröste and Fischer-Møller (1943), and especially statistical methods such as discriminant analysis have been developed. The so-called DSP method (Diagnose Sexuelle Probabiliste, Murail *et al.* 2005, Brůžek *et al.* 2017) is a case in point. Based on reference data from more than 2000 skeletons (pelves), it provides a reliable sex estimation tool. Finally, the transition analysis method for age-at-death estimation (Boldsen 2002, Milner and Boldsen 2012) as well as a host of regression methods for stature estimation (see further down) has also been developed.

These recent advances have allowed us to reanalyse the Koelbjerg skeleton and address some of the fundamental enigmas. In this study, we combine classical and statistically based osteological methods and DNA analyses to determine the individual's sex. Further DNA analyses are employed to determine the individual's mitochondrial DNA haplogroup, while strontium isotope analyses are carried out to establish if the Koelbjerg individual was likely a local inhabitant of the hilly Maglemosian landscape that is now Funen. We will describe the methods and results from each discipline individually, followed by a brief overall discussion. The uniqueness of the find in question has led us to minimise the use of destructive sampling and thereby ensures the presence of sample material for future analyses.

Osteological anthropological analyses

Sex revision of Upper Palaeolithic and Mesolithic skeletons

For many years in palaeoanthropological analyses, the general robusticity of the skull and infracranial skeleton was commonly employed as indicator of the sex. As already mentioned by Weiss (1972), and reiterated by Donlon (1993) and Walker (1995), there appears to be a systematic bias in sexing skeletal collections from archaeological sites, with some

Figure 2. Most of the remaining parts of the Koelbjerg skeleton are well preserved. Only the bones of the pelvis are somewhat fragmented. The right femur is a cast of the bone which was used for ^{14}C-dating in the mid-1980s (photo: Jens Gregers Aagaard).

Figure 3. (a) The Koelbjerg skull, lateral view. (b) Anterior view (photo: Jens Gregers Aagaard).

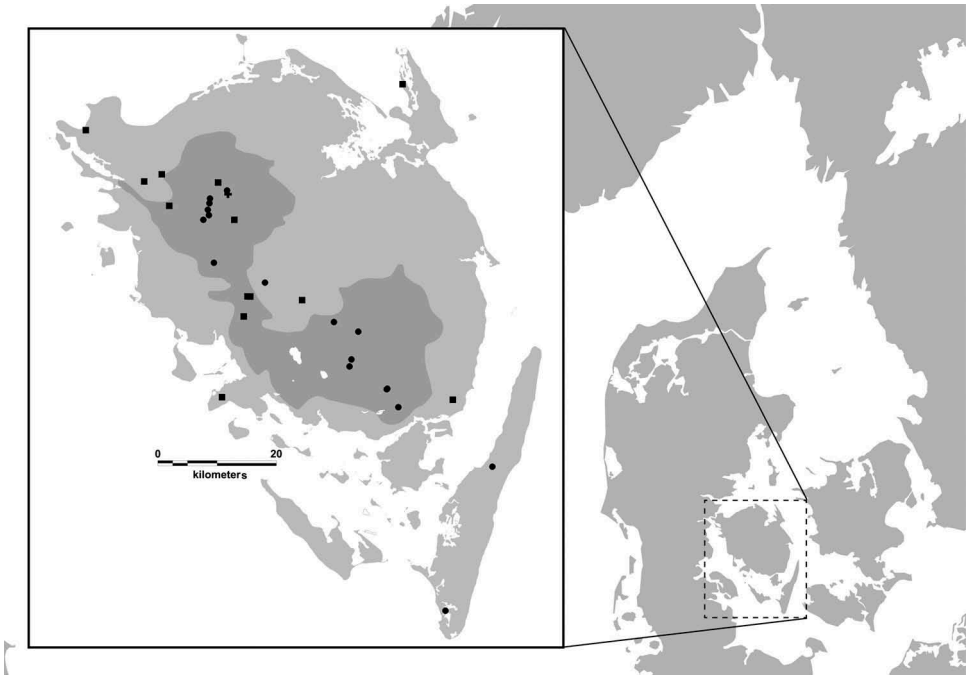

Figure 4. Present-day Funen and the surrounding islands with archaeological finds from the early Maglemosian period, *c*. 11,000–9800 cal BP. Cross: Koelbjerg. Circle: Flint. Square: Single finds (drawing is based on the national heritage database; Fund og Fortidsminder, data retrieved 29. August 2017).

female skeletons being estimated to represent males, the reason being that the qualitative traits employed as sexual indicators in extant populations are not necessarily suitable for past populations. In case of Upper Palaeolithic skeletons for instance, this bias will often result in most of the specimens being estimated to be males as already mentioned by Bröste and Fischer-Møller (1943).

It is difficult to infer cranial sexual dimorphism in past populations, due both to sample-size limitation and the often poor state of preservation of ancient skeletal remains. With regard to cranial morphology, a failure to take age changes and especially populational variation into account can also introduce significant biases in sex estimation. Heavy masticatory and physical activity may influence the appearance of the skull and skeleton to appear more masculine. There is general agreement among scholars that skeletal morphological differences between the sexes, and consequently the reliability of sex estimation, are most

pronounced in the adult pelvis. In the last decade, a highly reliable method, based on discriminant function analysis including a probabilistic approach for sex estimation (DSP) of the hipbone, has been developed (Murail *et al.* 2005, Brůžek *et al.* 2017) and employed (e.g. Bruzek and Murail 2006, Gambier *et al.* 2006). The method can also be applied to incomplete pelves but the estimation becomes uncertain when sexually dimorphic functional parts or segments of the os coxae are not well preserved.

The DSP procedure was recently applied to a large sample of European Upper Palaeolithic and Mesolithic skeletons in order to reassess previous sex estimates (Villotte 2009). In the review of these specimens, an evaluation of pelvic morphological traits and the pelvic discriminant function analysis (DSP) were employed. Out of 40 specimens, the DSP procedure arrived at different sex estimations in five cases, relative to the conclusion reached in the primary publications.

Over the years, comparative studies of Upper Palaeolithic and Mesolithic skeletal remains have included the Koelbjerg individual as a female, for example Constandse-Westermann (1974), Henke (1987) and Gerasomova and Pežemskij (2005), essentially without questioning the sexing, and based on the original publications of the skeleton (Bröste and Fischer-Møller 1943, Bröste and Balslev-Jørgensen 1956). In the latter, the authors acknowledge that the sex estimation posed problems. The cranium was regarded as presenting traits indicating that it represents a male, while the gracile impression of the long bones indicates a female. Bröste and Fischer-Møller (1943) also conclude that the pelvis, despite being incomplete, suggests that the skeleton represents a female. In a later publication, Bröste and Balslev-Jørgensen (1956) reiterate their arguments and conclusion, and the same applies to a more recent paper by Bennike (1986).

This generally accepted estimation of the Koelbjerg skeleton as a female has previously been questioned by Petersen (1998, 2004), primarily because the pelvis was deemed to show male characteristics, and by Newell *et al.* (1979). Based on the reservations presented, and the frequency of revised sex estimations in other cases in recent years (e.g. Gejvall 1970, Sommer 2007, Ahlström 2013), the Koelbjerg remains have been restudied to revise the sex estimation of this individual (preliminary results in Petersen *et al.* 2009).

The Koelbjerg skeleton – a brief description

The Koelbjerg skeleton is fairly well preserved (see above and illustrations in Henriksen and Hansen 2017), with the cranium, including the upper face and most of the base and mandible. The dentition is represented by 11 teeth (6 upper molars and premolars, 5 lower molars). Substantial portions of the infracranial skeleton are preserved: parts of upper limbs (right humerus, both ulnae, left radius), left and right femora, tibiae and fibulae. The hand, foot and vertebra bones are missing. The lack of these relatively inconspicuous skeletal elements is most likely to be a result of the finds circumstances: lay persons' peat digging.

The pelvic remains are incomplete, consisting of the upper part of the sacrum and a large part of the right innominate bone. The pubic bone is nearly complete, lacking a portion of the inferior ramus, but with the pubic symphysis intact. The iliac wing lacks its superior part, while the auricular surface is partly preserved, as is the acetabular region. The sciatic notch is incompletely preserved and the ischium is absent (Figures 5 and 6). Even so, the anatomical regions present are sufficient to enable reconstruction of the overall shape of the pelvis, several sexually diagnostic regions are represented and a number of variables employed in the DSP procedure can be ascertained.

As the distal humerus carries information for sex estimation (Rogers 1999), two different aspects of this skeletal region from the right humerus are presented in Figure 7.

Transition analysis (Boldsen 2002, Milner and Boldsen 2012, ADBOU 2016), based on 5 out of 5 bilateral cranial traits and 10 out of 14 pelvic traits (only one side recorded), was used for evaluating the age at death of the Koelbjerg individual, employing the procedure developed for archaeological male specimens with unknown ancestry. The scores for the anatomical features employed are given in Table 1. The age at death can be estimated to be in the interval 21–33 years, with a most probable age of *c.* 27 years, with similar age-at-death estimates for pelvis and cranium. The result is broadly in accordance with age-at-death estimations based on more qualitative methods (Bröste and Fischer-Møller 1943, Bennike 1986).

Figure 5. (a) The remains of the right innomiate bone, medial view. (b) Lateral view (photo: Jens Gregers Aagaard).

Figure 6. (a) The preserved parts (fragment of right innomiate bone and fragment of os sacrum) of the pelvis, frontal view. (b) Inlet view (photo: Jens Gregers Aagaard).

Figure 7. (a) The Koelbjerg distal humerus, posterior view. (b) Inferior view (photo: Jens Gregers Aagaard).

Table 1. Scores of anatomical features used in the age-at-death estimation by transition analyses.

Anatomical feature	Score
Cranial sutures	
Coronal pterica	4
Sagittal obelica	2
Lambdoidal asterica	1
Interpalatine suture	2
Zygomaticomaxillary suture	2
Pubic symphysis	
Topography	3
Texture	2
Superior protuberance	2
Ventral margin	3
Dorsal margin	3
Auricular area	
Superior topography	2
Inferior topography	2
Superior characteristics	4
Apical characteristics	3/4
Superior exostoses	2

For cranial sutures right and left scores were equal.

The osteological assessment presented here was initiated because the conclusions in the primary publications state ambiguity concerning the sex estimation, where the cranium and long bones present conflicting evidence, and especially because no description is given of the anatomical details of the pelvis. The strongest previously presented evidence for the skeleton representing a female is the gracility of the limb bones and some of the cranial features. They are indeed very gracile relative to standard robusticity indices, and even when compared to female skeletons from the Upper Palaeolithic and Early Mesolithic (Jacobs 1985). However, as a large part of the pelvis is present, this part of the skeleton could be analysed in further detail.

Sex estimation

In the following, we present the results of three different morphological and osteometric approaches to the sex estimation of the Koelbjerg skeleton, all based on infracranial material. The cranial morphology was not included due to the reservations and uncertainties mentioned in the introduction to this section. Exemplifying this, Mesolithic crania, both males and females, are often very robust compared to present-day populations, as already noticed by Bröste and Fischer-Møller (1943). Moreover, a preliminary multivariate discriminant analysis based on more than 40 Mesolithic crania yielded an inconclusive sex classification for the Koelbjerg skeleton (results not shown).

The first analysis consists of scoring a set of classical morphological features of the pelvis used for sex estimation (Phenice 1969, Bruzek 2002, Rösing *et al.* 2007). The state of preservation of the Koelbjerg pelvis (Figure 5) limits these traits to the following: ventral arch, composite arch, subpubic concavity, medial aspect of pubic bone, subpubic angle and crista phallica. Dorsal pitting of the pubic bone at the symphysis was also recorded (Stewart 1970).

Second, we present the results of a morphometric study of the pelvis, using the DSP method and software, version DSP2 (Brůžek *et al.* 2017; http://projets.pacea.u-bordeaux.fr/logiciel/DSP2/dsp2.html). Measurements were performed by the second and fourth author, with an accuracy of 0.5 mm. Measurements showing a greater than 1 mm difference between the values obtained by the second and fourth author were repeated by the fifth author.

Finally, we briefly discuss some indices of infracranial robusticity such as diaphysical robusticity indices, relative size of the femoral head and the cnemic index (Jacobs 1985), as well as the morphology of the distal humerus (trochlear asymmetry and constriction), shape and perforation of the fossa olecrani and angle of epicondylis medialis (Rogers 1999) (Figure 7).

Table 2 shows the observations of morphological characters on the pelvis (Figures 5 and 6) and most of these were indicative of a male. The presence of a crista phallica cannot be confirmed with certainty, as the region of the pubis is not entirely preserved. The absence of dorsal pitting of the pubis is, in itself, not an indicator of the sex, but presence of such pitting has been claimed to indicate a female (Stewart 1970), although males can also show this trait (see Ahlström 2013, and references herein).

The measurements for the DSP method are given in Table 3. In the DSP analysis, the means of the two, respectively three, measurements were used.

Table 2. Observations on pelvic morphological characters and their resulting sex indication.

Trait	Status	Indicated sex
Ventral arch (P)	Absent	♂
Composite arch (B)	Absent	♂
Subpubic concavity (P)	Absent	♂
Medial aspect (P)	Relatively broad	♂
Subpubic angle (R)	80–84°	♂
Crista phallica (B)	Present (?)	♂ (?)
Dorsal pitting at pubis (S)	Absent	♂ (?)

Traits following: B: Bruzek (2002), P: Phenice (1969), R: Rösing *et al.* (2007); S: Stewart (1970).

Table 3. Measurements for the DSP analysis, all in millimetres.

	Author		
Variable	2nd	4th	5th
Acetabulo-symphyseal pubic length (PUM)	70.0	71.0	–
Cotylo-pubic width (SPU)	24.5	25.0	–
SS length	71.0	69.0	70.0
SA length	67.5	68.0	–
VEAC	59.0	61.0	63.0

SS: Spino-sciatic; SA: spino-auricular; VEAC: vertical acetabular diameter.

The following posterior probabilities were obtained: p(male) = 0.980, p(female) = 0.020.

Regarding infracranial robusticity, we acknowledge that the long bones of the Koelbjerg skeleton show a very gracile morphology when assessed according to the classical indices of diaphysis robusticity and compared to the sex-specific averages for Late Glacial and Early Postglacial European populations, as shown in Jacobs (1985). However, the relative size of the femoral head (105.8) and the cnemic index (63.3) are both closer to the male averages than to the female averages for these populations. It should also be mentioned that essentially all the infracranial indices indicating female are dependent on long bone lengths and will thus be highly correlated. Long bone gracility can essentially in this respect be regarded as a single trait. For a list of these indices and the definitions, see Appendix. Morphological traits of the distal humerus, discussed by Rogers (1999), also indicate a male-like pattern: an asymmetric and only slightly constricted trochlea, a triangular shape of the imperforated fossa olecrani and a flat angle of the medial epicondyle (Figure 7). Given that the pelvis and the long bone epiphyses show male traits and the posterior probability for male in the DSP analysis is close to unity, the conclusion of the osteological–anthropological analysis is that the skeleton represents a male with gracile long bone epiphyses.

Based on the results of the anthropological analyses, we must conclude, that the skeleton represents a relatively slightly built person, most likely to be a man and in his late-20s at the time of his death. Further, estimates of the living stature of the Koelbjerg man, comprising a range of different models (e.g. Pearson 1899, Sjøvold 1990), indicate that he was most likely just above 160 cm.

Clearly, our result contradicts most of the earlier attempts to estimate the sex of the Koelbjerg skeleton. This calls for a need to confirm the result with several independent methods.

Ancient DNA analysis

Laboratory work and methods

The DNA analysis of the Koelbjerg skeleton was conducted in a dedicated ancient DNA laboratory at the Centre for GeoGenetics, Natural History Museum, University of Copenhagen, according to strict aDNA guidelines (e.g. Willerslev and Cooper 2005). The right side third upper molar was selected for DNA extraction and sampled from the root by removing the inner dentine layer, thereby enriching for the outer DNA-rich cementum layer, as outlined previously (Damgaard *et al.* 2015). Approximately, 200-mg cementum was crushed and DNA extracted using a silica-in-solution protocol, with a 15-min predigestion step (Damgaard *et al.* 2015) and a binding buffer optimised for retaining very short DNA molecules (Allentoft *et al.* 2015). Following extraction, 20 µl of DNA extract was built into a blunt-ended, double-stranded library using the NEBNext DNA Sample Prep Master Mix Set 2 (E6070) and a pool of four Illumina-specific adapters (Meyer and Kircher 2010). The library preparation protocol was similar to that used by Allentoft *et al.* (2015) apart from the amplification step, described here: 1 µl of library was first amplified with qPCR and SYBR Green detection chemistry and the CT values recorded. The entire remaining DNA library (*c.* 24 µl) was then amplified and indexed in a 50-µl PCR reactions containing 1× KAPA HiFi HotStart Uracil + ReadyMix (KAPA Biosystems, Woburn, MA, USA) and 200 nM of each of Illumina's Multiplexing PCR primer in PE1.0. Thermocycling conditions were 1 min at 94 °C, followed by 10 cycles (determined by qPCR) of 15 s at 94 °C, 20 s at 60 °C and 20 s at 72 °C, and a final extension step of 1 min at 72 °C. The amplified DNA library was profiled on an Agilent Bioanalyzer 2100, and shotgun sequenced (100 bp, single read) on an Illumina HiSeq 2500 platform at the National High Throughput DNA Sequencing Centre (University of Copenhagen).

Bioinformatics

A total of 243,911,574 DNA sequences were generated from the tooth sample. The sequences were base-called using CASAVA v.1.8.2 and de-multiplexed with a requirement of full match of the six nucleotide indexes. The adapter sequences were

removed using AdapterRemoval2 (Schubert *et al.* 2016), retaining 239,583,126 reads with a minimal length of 30 bp. The trimmed sequences were then mapped against the human mitochondrial reference genome (rCRS, NC_012920.1) using bwa (v.0.7.5) aln (Li and Durbin 2009) with mapping quality >30 and seeding disabled. Duplicate reads were removed with Samtools v.0.1.19 (Li *et al.* 2009), resulting in a total of 9401 human mtDNA sequences with an average length of 55.3 bp and a complete mitochondrial genome of 31.4-fold coverage (31.4X).

Haplogroup

The mitochondrial sequences were imported into Geneious v.8.1.7 for manual inspection and the consensus sequence was generated using sites with a minimum of 5X coverage and >75% concordance between the reads. The complete mitochondrial sequence of the Koelbjerg skeleton is available from GenBank (https://www.ncbi.nlm.nih.gov/genbank/) under accession number MF992925. The mtDNA haplogroup was determined using HaploGrep2 (http://haplogrep.uibk.ac.at/) to U5a2c with a quality score of 100. U5 haplogroups were common in the Mesolithic populations of Europe but became rare in the Early Neolithic times (Brandt *et al.* 2013, Posth *et al.* 2016). In the most comprehensive analysis of the European pre-Neolithic mitochondrial gene pool conducted to date (based on complete mitochondrial genomes), Posth *et al.* (2016) observe variants of U5 in 31 of 55 individuals. The same study reports a U5a2c haplogroup (same as Koelbjerg) in a Mesolithic individual from Felsdach Inzigkofen in Germany (Figure 8), dated to 8680 cal BP. Our observation of an U5 haplogroup variant supports the contention that the Koelbjerg individual belonged to the European Mesolithic gene pool, testifying to both the great age of the skeleton and the authenticity of the analysed DNA. However, in-depth analyses of the nuclear genome are needed to provide more details into the population affinity of this individual. Such data will be presented elsewhere.

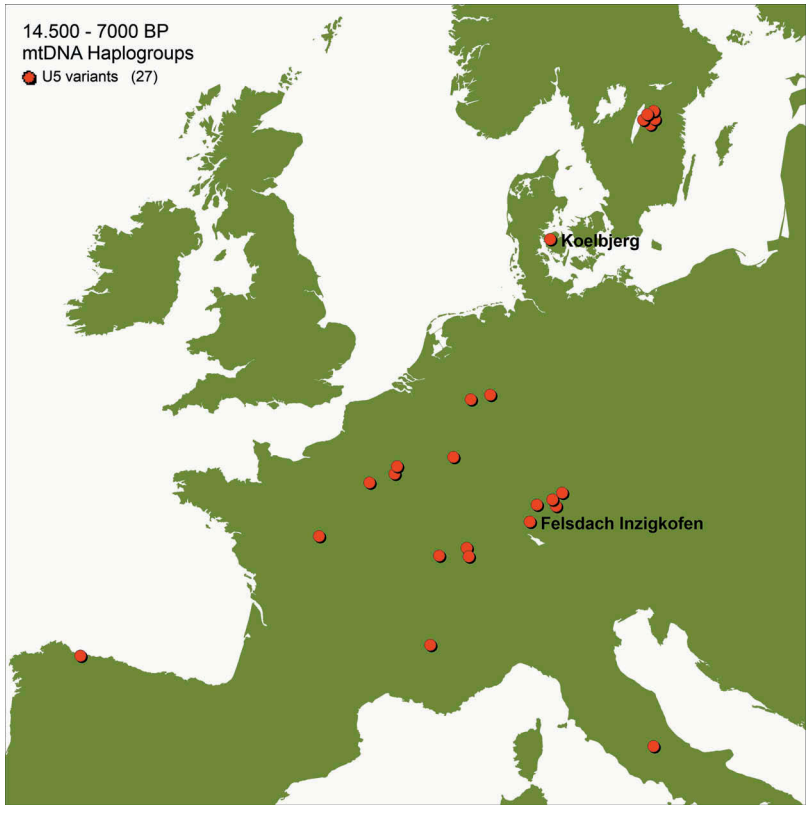

Figure 8. Geographical distribution of Mesolithic individuals displaying mitochondrial haplogroup variants within the U5 clade. All observations except for Koelbjerg are from Posth *et al.* (2016), which is the largest analysis of the European pre-Neolithic mitochondrial gene pool conducted to date. This study identifies U5 variants in 26 of 29 Mesolithic individuals. The same study reports a U5a2c haplogroup (same as Koelbjerg) in a Mesolithic individual from Felsdach Inzigkofen in Germany (map: Kristine Stub Precht).

Authenticity

To address the authenticity of the DNA molecules, we conducted analyses of DNA damage using MapDamage v.2.0.5 and recorded a C–T transition damage rate of 33.9% at position 1 in the 5′ end. This is a very high damage level, reflecting the great age of the molecules and comparable to that observed in previous ancient DNA studies (e.g. Allentoft *et al.* 2015). To further assess the authenticity, we conducted an analysis of contamination based on all the mtDNA reads using ContamMix (Fu *et al.* 2013). ContamMix estimates how well all the mtDNA sequences match the Koelbjerg consensus sequence compared to a collection of 311 different mitochondrial genomes from human populations worldwide. With an estimated contamination level below 0.1% (MAP authentic = 0.09%, 95% CI = 0.01–2.05%), the result shows that the Koelbjerg DNA extract does not contain human DNA from more than one source.

Sex determination

Finally, we determined the sex of the individual. To do this, we performed a full genomic mapping of our shotgun data against the human reference genome HG19 build 37.1 with settings as above and recorded the number of reads assigned to the X and Y chromosomes, respectively. Skoglund *et al.* (2013) define a value R_Y as R_Y = ChrY/(ChrY + ChrX), with ChrY and ChrX being sequences assigned to chromosomes Y and X, respectively. Based on empirical sequencing data for modern and ancient individuals of known sex, the authors conclude that if the lower 95% confidence interval boundary of R_Y is >0.077 (assuming a normal approximation), then the individual is a male, and if the upper interval limit is <0.016, then the individual is a female. In the case of the Koelbjerg skeleton, we obtained a lower boundary on the R_Y confidence interval of 0.087 (Table 4), securely identifying this individual as a male.

Having concluded that the Koelbjerg individual was a male, most likely in his late 20s and belonging to the common Mesolithic mtDNA haplogroup U5a2c, leaves us with the final question of whether he was local to the area where he died or if he was more likely to be an itinerant hunter who originated far away from present-day Funen.

Table 4. Number of sequences assigned to the sex chromosomes and used to calculate R_Y as defined above.

ChrY + ChrX	ChrY	R_Y	95% CI	Sex
210,707	18,544	0.088	0.087–0.089	XY

The 95% lower boundary on the R_Y values is >0.077, which securely identifies this skeleton as a male (XY).

Strontium isotope analyses

Laboratory work and methods

In order to investigate the provenance of Koelbjerg Man, we conducted strontium isotope analysis of tooth enamel from one of his first molars. The sample consisted of a small piece of enamel collected previously, as tensions in the tooth had caused a few fragments to split off from one of the first molars of the upper jaw (Figure 9); hence, no additional handling was necessary.

In humans, tooth enamel of permanent teeth mineralises during early childhood with the exception of the third molar (wisdom tooth). The first molar mineralises between the perinatal stage (before birth) and 3–4 years of age and it does not remodel thereafter, thereby carrying childhood information on geographic origin (Hillson 1996). The strontium isotope signature of the enamel of the human first molar is consequently used in archaeology as a proxy for the place of origin of the individual being investigated (Montgomery 2010).

The sample of tooth enamel from the Koelbjerg individual was mechanically pre-cleaned with a dental diamond drill and subsequently washed ultrasonically in ultrapure (Milli*Q*™) water. The clean sample was introduced into a 7-ml pre-cleaned Teflon beaker (Savillex™) and dissolved in a 1:1 solution of 0.5 ml 6 N·HCl (Seastar) and 0.5 ml 30% H_2O_2 (Seastar). The sample decomposed rapidly after approximately 5 min, and the solution was dried down on a hotplate at 80 °C.

The sample was taken up in a few drops of 3N·HNO_3 and then loaded on a disposable extraction column with a 0.2-ml stem volume charged with intensively pre-cleaned mesh 50–100 SrSpec™ (Eichrome Inc.) resin. The elution recipe essentially followed that by Horwitz *et al.* (1992) scaled to our needs. Strontium was subsequently eluted/stripped by pure deionised water and then the eluate was dried on a hotplate. The strontium sample was dissolved in 2.5 µl of a Ta_2O_5–H_3PO_4–HF activator solution and directly loaded onto previously outgassed 99.98% single rhenium filament. The sample was measured at 1250–1300 °C in dynamic multi-collection mode on a VG Sector 54 IT mass spectrometer

Figure 9. Detail of the Koelbjerg skull, upper jaw, inferior view (photo: Jens Gregers Aagaard).

(TIMS) equipped with eight faraday detectors (at the Department of Geoscience and Natural Resource Management, University of Copenhagen). An amount of 5 ng loads of the NBS 987 Sr standard gave $^{87}Sr/^{86}Sr = 0.710237 \pm 0.00001$ ($n = 10$, 2σ).

Strontium isotope results

The strontium isotope bioavailable range for Denmark, the so-called baseline or isoscape, has previously been established for surface waters and fauna yielding a combined $^{87}Sr/^{86}Sr$ range of ~0.708–0.711 (excluding Bornholm) (Frei and Frei 2011, Frei and Price 2012, Frei 2013). The strontium isotope analysis of the tooth enamel sample from Koelbjerg Man's first molar yielded a $^{87}Sr/^{86}Sr = 0.71005$ ($\pm 2\sigma$ 0.00004). Consequently, this individual's value falls clearly within the Danish baseline range (Figure 10).

Previous stable isotope investigations have suggested that marine food was neglectable or completely missing in this individual's diet during adulthood (Fischer *et al.* 2007). Hence, based on the assumption that his diet did not change drastically between childhood and adulthood, we conclude that the strontium isotope value that we measured in the first molar was not affected by a marine signature.

In conclusion, it seems most likely that this individual was of local provenance; however, several other areas with similar bioavailable strontium isotopic ranges cannot be excluded. Areas with such ranges can be found for example in Britain (Evans *et al.* 2010) and in northern Germany (Voerkelius *et al.* 2010, Price *et al.* 2017).

Discussion and conclusion

An unusually fortunate combination of circumstances resulted in the Koelbjerg skeleton coming to Odense City Museums about 75 years ago, accompanied by detailed contextual information. In the 1940s, nobody anticipated the invention of methods that would allow for an ancient individual's precise age and sex to be established and reveal details of the person's diet, place of origin and genetic ancestry.

With this article, several fundamental questions concerning the *c.* 10,500-year-old skeleton from Koelbjerg have been reappraised and new conclusions drawn. As a result of the coinciding results based on the anthropological and ancient DNA analyses, we conclude that the skeleton is that of a man. Moreover, based on our combined ancient DNA and strontium isotope analyses, it seems as this individual was local and has a genetic profile very typical for the European Mesolithic population.

The new study of the Koelbjerg individual clearly demonstrates the importance of allowing to perform revaluation of old results and how new interpretations are possible as methods advance.

With the results presented here, we have significantly increased our knowledge on the Koelbjerg skeleton but there are ample opportunities to

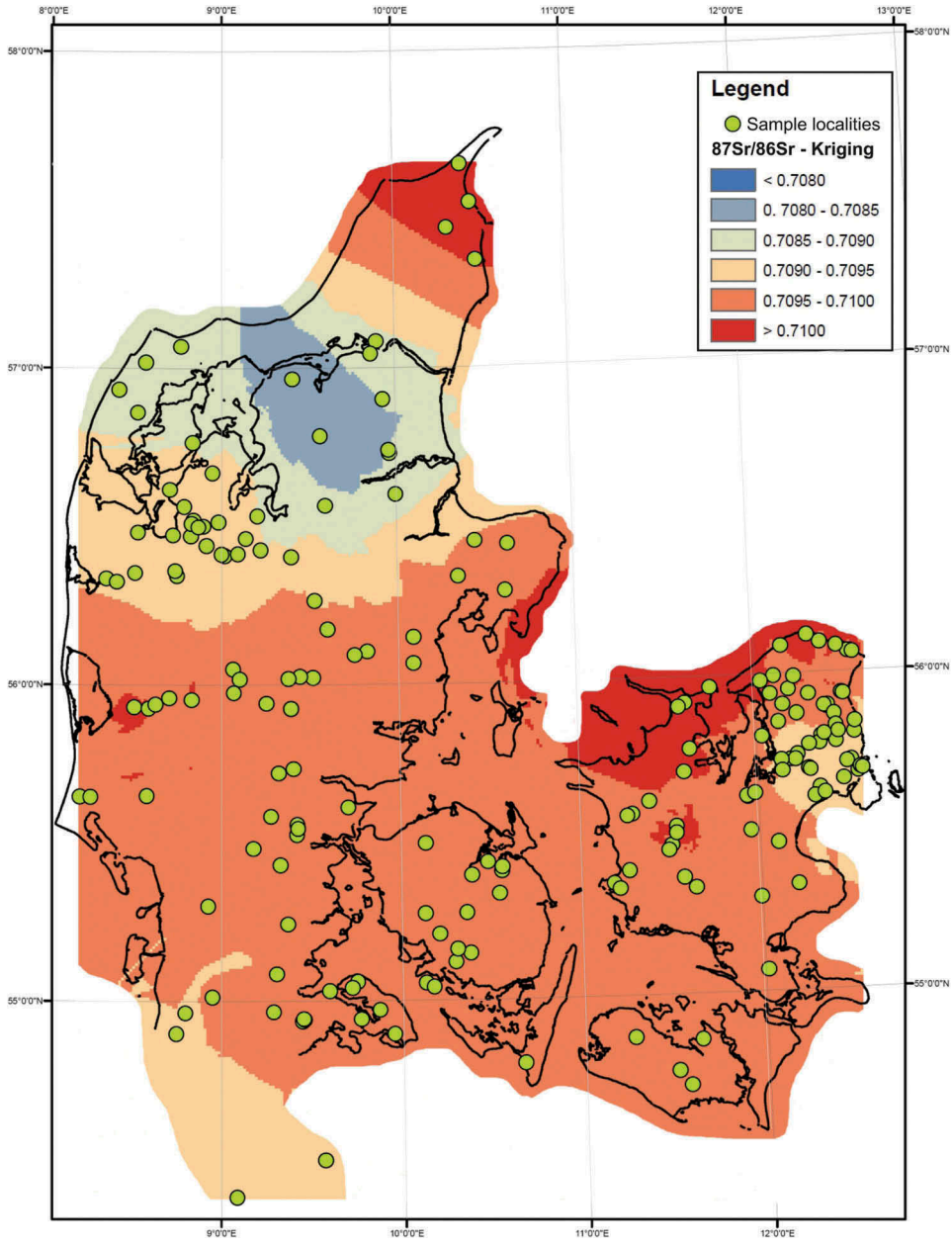

Figure 10. Map depicting the bioavailable strontium isotope ranges as measured in surface waters from Denmark (excluding Bornholm), after Frei and Frei (2011).

continue the scientific work. For example, dietary and provenance studies could proceed on the basis of methods within the continuously developing field of stable isotope analysis. Furthermore, on the subject of diet, a remarkable diversity of information can often be obtained by analysing the calculus found on the teeth of prehistoric skeletons (e.g. Weyrich *et al.* 2017) and these are present in abundance on the teeth of the Koelbjerg Man (Figure 11).

The obvious gracility of the long bone diaphyses also needs to be investigated in a broader Mesolithic context. Lastly, further genomic analyses of the Koelbjerg skeleton are ongoing in order to provide a more detailed understanding of the Mesolithic gene pool in Denmark.

Although advanced modern analytical methods have been able to close several important gaps in the Koelbjerg Man's life history, they cannot explain why he ended up at the bottom of a small lake. In a Neolithic, Bronze and Iron Age context, it is commonly suggested that at least the carefully placed bog bodies are result of a planned chain of events as part of either offerings, punishment of criminals or regular burials (e.g. Van Der Sanden 1996, Bennike

Figure 11. The lower jaw with calculus on the teeth (photo: Jens Gregers Aagaard).

1999, Ravn 2010). This however contrasts with the Koelbjerg skeleton, as the bones were found scattered both vertically and horizontally in the mire deposits, as much as 10 m apart.

Already in the first publication by Troels-Smith (1943), this was interpreted as a consequence of the corpse floating in the water, with appendages and body parts gradually falling apart in the process. Modern forensic studies have given us a considerable insight into the processes that take place when a corpse decomposes in water (Haglund and Sorg 2002) and on this basis, the original interpretation seems very likely. In that light, it seems plausible that the corpse entered the water during the warmer months, when development of gases in the abdomen resulted in it rising to the surface, where decomposition and decay took place. If the corpse had entered the water in winter, it would probably have become incorporated into the lake deposits as an articulated skeleton. This sequence of events does, however, leave open the possibility that parts of the skeleton may still be preserved in the wetland sediments at Koelbjerg (Figure 12).

Figure 12. The findspot near Koelbjerg, on central Funen. Missing parts of the skeleton could possibly still be found in nowadays bog/lake (photo: Anders Fischer).

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Disclosure statement

No potential conflict of interest was reported by the authors.

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Appendix

Mean robusticity and relative indices for postgracial European sample from Jacobs (1985), female values adjusted for Koelbjerg not being a female. M no. indicates measurement number/definition in Martin and Saller (1957).

Bone and index	Males	Females	Koelbjerg
Humerus			
Robusticity (M7 × 100)/M1	20.6	18.5	17.4
Relative head height (M10 × 100/M1)	15.3	15.3	14.2
Relative biepicondylar breadth (M4 × 100/M1)	19.8	18.9	16.8
Femur			
Robusticity (√(M6 × M7)/M1)	0.067	0.063	0.060
Pilastric index (M6 × 100/M7)	114.7	106.1	108.3
Metric index (M10 × 100/M9)	80.0	76.3	71.0
Relative head diameter (M18 × 1000/M1)	107.0	101.8	105.8
Relative distal epiphyseal breadth (M21 × 100/M1)	19.2	18.2	17.8
Tibia			
Robusticity (√(M8 × M9)/M1a)	0.076	0.069	0.061
Cnemic index (M9a × 100/M8a)	63.9	62.4	63.3
Relative proximal epiphyseal breadth (M3 × 100/M1a)	21.4	21.0	19.3

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ARTICLE

Temporalising the house: exploring alternative perspectives on time and the archaeological record within Danish settlement archaeology

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ABSTRACT

This article calls for a renewed debate on the role played by time and temporality within Danish settlement archaeology. Recent theoretical debate has challenged the conventional way of thinking about time in archaeology by drawing attention to the multitemporal character of the archaeological record. In the article, the temporalisation of the archaeological record of the house is discussed based on a critical review of the archaeological process. The analysis shows how basic excavation and archiving practices favours a temporalisation of the house based on the chronological date and, at best, downplays other temporalities. The inherent temporalities of the archaeological record of the house, particularly the posthole, are discussed, and it is argued that the posthole should both be perceived as an object and a process in order to create space for alternative temporalities. Instead of seeing stratigraphy as a property of the posthole, the posthole should be seen as an assemblage made up of the events and materials that created the stratigraphy, a process which is directly related to the life history of the house. It is argued that a multitemporal perspective is a prerequisite for new and fruitful ways to understand the house as an archaeological and cultural phenomenon.

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Posthole; house; excavation methods; archiving methods; archaeological data; temporalisation; multitemporality; assemblage

The investigation of house constructions has a long tradition within Danish settlement archaeology. The first traces of prehistoric houses were identified at the turn of the century (Müller 1906), and the number of excavated houses has increased drastically since then. In order to place houses in their right chronological and culture-historical context, a central focus of Danish settlement archaeology has been to investigate the date of the individual house. As a consequence, much research within the field has been aimed at refining both typological studies of houses and scientific dating methods. Latest exemplified by renewed, regional house-chronological studies (Eisenschmidt 2013, Hansen 2015, Laursen and Holst 2017) as well as experiments using large numbers of C14-datings to obtain statistically more precise dates for excavated houses (Villumsen 2013, Hansen 2015). On that background, it seems uncontroversial to claim that the role time and temporality have played in Danish settlement archaeology has primarily been in the form of chronological dates.

In this article, I argue that a renewed debate about the role of time and temporality within Danish settlement archaeology is needed. The predominant position of the chronological date has previously overshadowed other temporalities inherent in the archaeological record and limited the understanding of the house. To encourage the debate, it is suggested that the inclusion of a multitemporal perspective is a prerequisite for new and fruitful ways to understand the house as an archaeological and cultural phenomenon.

Temporalising the record

In very basic terms, *temporalisation* is the process of creating a connection between time and the archaeological record which takes place through the archaeological process based on the entities used in the recording process and the time perspectives reproduced (Munn 1992, p. 116). On a more general level, temporalisation is crucial to the way archaeological data are shaped and interpreted and thereby

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also for the possibilities for further engagement and reinterpretation of the material (Bowker 2005, p. 12, Lucas 2012, p. 91, Nativ 2017, p. 670).

In settlement archaeology, the chronological date has traditionally been regarded as a fundamental temporal condition of the archaeological record and as a prerequisite to untangle the spatial development of settlements (Holst 1999, p. 21). Chronological dates, whether expressed in calendar years or in culture-historical periods, represent a linear temporality, where time is perceived as individual, measurable time units succeeding each other (Lucas 2005, p. 10). This perception of time is often supported by representations of chronologies or typologies as forward-moving timelines built up by graphically separate periods (Rosenberg and Grafton 2010, p. 20, 244). An epistemological predisposition to consider time as linear has been fundamental to the development of the archaeological field and is still to a large degree so deeply ingrained that it is taken for granted and rarely questioned by archaeologists.

However, anthropological studies have argued that linear time is just one among several simultaneous ways that humans perceive, use and understand time (e.g. Bloch 1977, Gell 1992, Munn 1992). The presentation of alternative temporalities has been followed by an increasing theoretical literature exploring the connection between time and the archaeological record (e.g. Gosden 1994, Thomas 1996, 2004, Olivier 2001, 2011, Lucas 2005, 2008, 2012, Pauketat and Alt 2005, Bailey 2007, McAnany and Hodder 2009, Ingold 2010, Arnold 2012, Witmore 2013, Gosden and Malafouris 2015, Sørensen 2015, Bille and Sørensen 2016, Hamilakis 2017). These studies have brought focus on the alternative temporal dynamics inherent in the archaeological record – both in terms of how time was perceived in the past (e.g. Gosden and Lock 1998, Bradley 2002, Stenholm 2012) as well as how time is represented, produced and reproduced in the archaeological process (e.g. Larsson 2006, Lucas 2008, Cobb *et al.* 2012, Bailey and Simpkin 2015, Nativ 2017). Furthermore, they have challenged the conventional way of thinking about time in archaeology by drawing attention to the fact that time, first, needs to be appreciated as more than an abstract, neutral 'container' and, second, that time, besides being measurable and linear, also is experienced, repetitive, durational, material, biographical, remembered, processual and non-linear. In other words, time in relation to the archaeological record should be treated as plural, complex and multitemporal.

Whereas the discussion of a more complex approach to time has been included for a long time in other fields of archaeology for instance in the study of monuments (e.g. Holtorf 1998, Thäte 2007), in the micro archaeology of burials (e.g. Fahlander 2003), in object biographies (e.g. Holtorf 2002, Joy 2009) and in some areas of settlement archaeology, particularly the British (e.g. Bailey 1990, Pearson and Richards 1994, Gerritsen 1999), it has only had limited – if any – impact on Danish settlement archaeology.

Generally speaking, Danish settlement archaeology is characterised by a relatively conservative and empirically founded approach to the field. This has, at least partly, its background in the organisation of Danish archaeology where rescue excavations often constitute more than 90% of all excavations per year (Mikkelsen 1998, Ejstrud and Jensen 2000, p. 125). Rescue excavations are generally characterised by a standardisation of methods and a fundamental approach to the excavation of archaeological remains as a process of recording and accumulating data for future research rather than the investigation of specific, targeted research questions (Mikkelsen 1998, p. 10–11, Jensen 2005, Møller *et al.* 2011). At the same time, more than 50% of all excavations over the last 20 years are categorised as settlement excavations (*source*: Fund&Fortidsminder). As a consequence, the logic of the rescue excavation has a great impact on the broader tradition of settlement archaeology. Research questions are mainly aimed at the development of settlement patterns in the wider cultural landscape, often on a positivistic background (e.g. Fabech and Ringtved 1999, Møller *et al.* 2011). In that sense, Danish settlement archaeology is closer connected to the German tradition of 'Siedlungsarchäeologie' (Gramsch 1996) than to the British post-processual landscape archaeology which only have had limited influence (Jensen 2005).

However, the multitemporal perspective represents ways of thinking about time that is very relevant for the further development of Danish settlement archaeology and should therefore be

explored. But in order to create space for a multitemporal recording of the archaeological record, the temporalisation process of the archaeological record within the current field must first be investigated.

So far, the discussion of time in relation to the archaeological record has to a large degree been a theoretical discussion. However, I will argue that the temporalisation of the archaeological record is equally a direct result of how the current theoretical notions of time is performed through the practices of the archaeological process and a discussion of the temporalisation should include both theoretical and practical aspects (Larsson 2006, p. 42–44, Cobb *et al.* 2012, p. 6).

The practical aspects are defined as the tradition of how the archeological record is investigated, recorded and archived, which to a large degree are defined by specific conditions as the organisation of the archaeology on a national and local level, the methods applied and the registration systems used in the process. The discussion of the practical aspects will therefore necessarily be quite specific and detailed. On the other hand, if the discussion is not also taken on this level, there is a severe risk that practice will continue as usual and fruitful theoretical discussions have no real impact (Hamilakis and Jones 2017, p. 81).

On that background, in this article, I will use a critical review of the typical excavation and archiving practice in current Danish settlement archaeology to serve as an example of the interaction between theory and practice in the temporalisation of the archaeological record related to the house. The aim of the article is to explore the possibilities of including a multitemporal approach to archaeological houses.

I begin by characterising the archaeological house as an archaeological phenomenon and the temporalities inherent within the archaeological record of the house. I then analyse the typical archaeological process of excavation and archiving, respectively, using Danish settlement archaeology as the starting point and discuss the principles of how the archaeological record is temporalised through the transformation process from remains to data. In the final discussion, I explore the principles of temporalisation and the advantages of including other temporalities into the recording of the archaeological record on a more general level. While much of the discussion is placed in a specific Danish context, it is my hope that the debate also will find resonance in other areas of archaeology and inspire to similar reviews of other national registration traditions for the benefit of the development of the broader field of settlement archaeology.

The house and the posthole

The discussion of temporalisation of the record is closely related to the basic question of what the archaeological record is an expression of. The first step must therefore be to characterise the archaeological record constituting the house and the temporal properties inherent within it. The conditions of the material outlined constitute the basic premises for the following analysis and discussion.

Settlement archaeology aims at studying the house as close to its original state as possible but in that process tends to overlook the marked differences between the house in its historical context (what it once was) and the house as an archaeological feature (what it is today) (Nativ 2017, p. 660). As the majority of settlement excavations in Denmark take place in open, cultivated fields and the standard excavation method is defined by removing the plough soil down to the surface of the subsoil, typically nothing of the actual physical house in the form of timber, roof, walls or floor layers is represented in the archaeological remains. Nonetheless, the term *house construction* is often used in all stages of the archaeological process whereas in reality, the majority of archaeological houses are identified solely as systematic collections of archaeological *features* (Näsman 1987, p. 75). The archaeological features constitute the foundations of the house and consist mainly of postholes dug into the subsoil to support the timber construction of the house. On that background, it would be correct to say that the majority of houses excavated in Denmark today are defined by *the posthole* rather than by the construction. As a consequence, the temporal properties of the house must to a large degree equally be defined by the temporal properties of the posthole, and the rest of this section will therefore focus on the posthole.

Conventionally, the primary temporal property of the posthole is the chronological date. The posthole can be dated in several ways, but first and foremost

based on what is found within it. As the post decays, artefacts and organic material from activities in the house can be caught in the hollows left by the decaying post (Zimmermann 1998, p. 50). Soil (including artefacts and organic material) can even deliberately have been filled into the hollows to stabilise the construction as the post decayed (Reynolds 1995, p. 23f). When the artefacts or organic material can be dated (typologically or scientifically) and a connection between finds and posthole is probable, the date is normally taken as an indicator of the posthole's chronological date. The posthole can also be dated stratigraphically if it is cutting or being cut by later or previous features. Whether the posthole is dated according to absolute or relative chronologies, the dating process is aimed at getting as uniform and precise a date as possible (Lucas 2005, p. 5, Laursen and Holst 2017, p. 18).

However, a single date only dates one particular (but rarely more precisely defined) moment in the existence of the posthole (Villumsen 2013, p. 19). And, it can be argued that the posthole, besides having an age (expressed by the date), also has a duration that stretches beyond a single date both practically as well as conceptually (Olivier 2001, p. 65ff, Bailey 2007, p. 217, Ingold 2010, p. 161, Arnold 2012, p. 88, Hansen 2015, p. 56f). The duration is defined as the time period the posthole was 'active' in. That means the time between the posthole was planned until it went out of use, a time period more or less equal to the lifetime of the house. This perspective opens for a perception of the posthole as the material residue of a sequence of *events* in the past (Harris 1989, p. 41f, Shennan 1993, p. 55, Pauketat and Alt 2005, p. 230f, Larsson 2006, p. 51, Lucas 2008, p. 60, McAnany and Hodder 2009, p. 9). Following Lucas (2008), an archaeological event is defined by being material, understood as an action (or sequence of actions) that takes place in relation to the material world and leaves a material residue. The event that creates the archaeological record can either be momentary or have a longer duration, as it can either consist of singular actions or practices (routinised actions) (Shennan 1993, p. 55, Lucas 2008, p. 61).

In its most banal description, a posthole is a hole dug to fix a post in the ground. But it is also a hole that is filled up when a post is raised as well as a hole that is emptied and loses its function when the house is demolished. In this perspective, the posthole is a process with a specific *chaîne opératoire* (Pauketat and Alt 2005, p. 217). The process can be identified, as many archaeological events have left an imprint on the posthole in the form of the stratigraphic entities: the primary cut, the post impression, the backfill etc. (Figure 1) (Zimmermann 1998, p. 25). Sometimes, secondary cuts and fills (which in some cases can have destroyed previous stratigraphical entities) even complicate the sequence of events. Instead of identifying the layers within the posthole on the basis of their physical presence, they can be identified by the events during which they were formed. Some events were short and momentary (e.g. the digging of the hole), whereas others had a longer duration (e.g. the decay of the post, the backfilling of the posthole), but each entity reflects events in relation to the history of the interweaving activities of building, using, maintaining and demolishing the house.

All in all, the posthole can be said to contain different temporal properties depending on the perception of the posthole as an archaeological phenomenon. In the typical dating process as described above, the posthole is treated as an object or artefact in itself, but the posthole can also be perceived as a process that implement an inherent temporality and duration of its own (Lucas 2012, p. 170, Felding and Stott 2013, p. 34, Gosden and Malafouris 2015, p. 701f, Bille and Sørensen 2016, p. 10). Different temporal perspectives do not mutually exclude each other and it is not possible to say that one temporal property is more 'fundamental' than the other (Gerritsen 2008, p. 146, Cobb *et al.* 2012, p. 8f). Which temporal dimensions that are represented in the archaeological record are instead defined alone by the entities used in recording and the temporal properties reproduced in the archaeological process. A multitemporal approach aims at representing as many temporal perspectives as possible.

The archaeological process

In the archaeological process, the archaeological record goes through a translation process where the archaeological record is transformed from fragmented material remains into coherent archaeological data, which are manageable in the interpretation

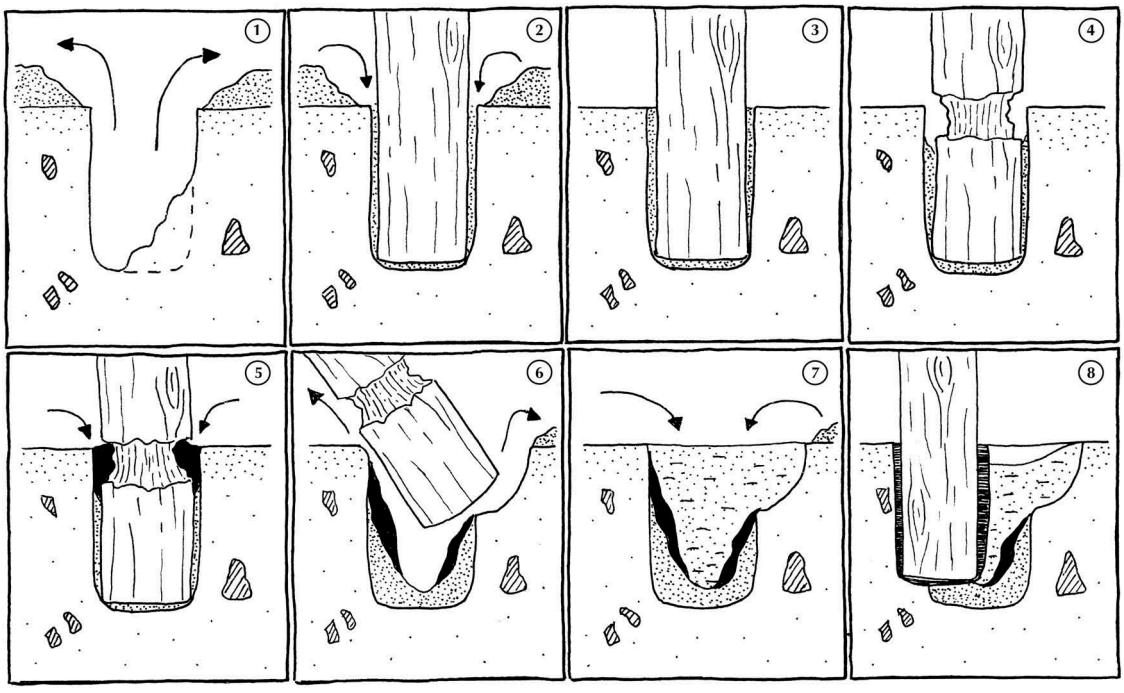

Figure 1. Schematic illustration of the archaeological events forming the posthole: (1) planning and digging the hole; (2) placing the post and backfilling the hole; (3) settling and stabilisation of the fill; (4) rotting of the post at the surface, where air and soil meets; (5) adding of secondary material coincidentally or deliberately; (6) removing the post when repairing or demolishing the house; (7) backfilling the hole, a process that happens either slowly or quickly; (8) if there are secondary cuts (contemporary or later than the primary post), it complicates the stratigraphy. Stratigraphical details can be disturbed or completely removed (drawing by author).

of the house (Larsson 2006, p. 43). In this context, *remains* are understood as the physical traces of past activities that are uncovered and identified during the archaeological excavation, and *archaeological data* are understood as the drawings, photos and descriptions that record and reproduce the physical traces as detailed as possible. Regardless the degree of details included in the recording, the transformative process from material remains to archaeological data will always translate the archaeological record from one medium (the material) to another (the textual) and in that way be interpretative (Figure 2) (Larsson 2006, p. 40, Lucas 2012, p. 238, Nativ 2017, p. 665).

Neither the identification of the archaeological remains nor the recording of them can be said to be completely objective parts of the translation process. To be recorded, the remains need to be identified and interpreted as remains of something, and recording itself is a creative and interpretative process describing the remains as they are perceived (McAnany and Hodder 2009, p. 2, Edgeworth 2012, p. 77, Nativ 2017, p. 670). Every choice in the process involves a selection of elements and a deselection of other elements (Bowker 2005, p. 12, Larsson 2006, p. 40). In that way, the archaeological data are constructed through the ways that archaeologists handle, document and archive the material (Bowker 2005, Lucas 2012). As archaeology is a destructive science, at the end of an excavation the archaeological remains will in most cases be gone. Only the archaeological data will persist, stored in archives and shared among archaeologists. The archaeological process is thus decisive for the creation of the foundation for future archaeological engagements with the site. The aim must therefore be to make as rich a reproduction of the archaeological record as possible.

Broadly speaking, the archaeological process typical for Danish settlement archaeology involves two main operations: excavating and archiving. In the *excavating process*, the material remains are initially identified, investigated and recorded. Most of this process takes place in the field, starting at the moment when the excavation begins. The aim of the excavation is to characterise and record data

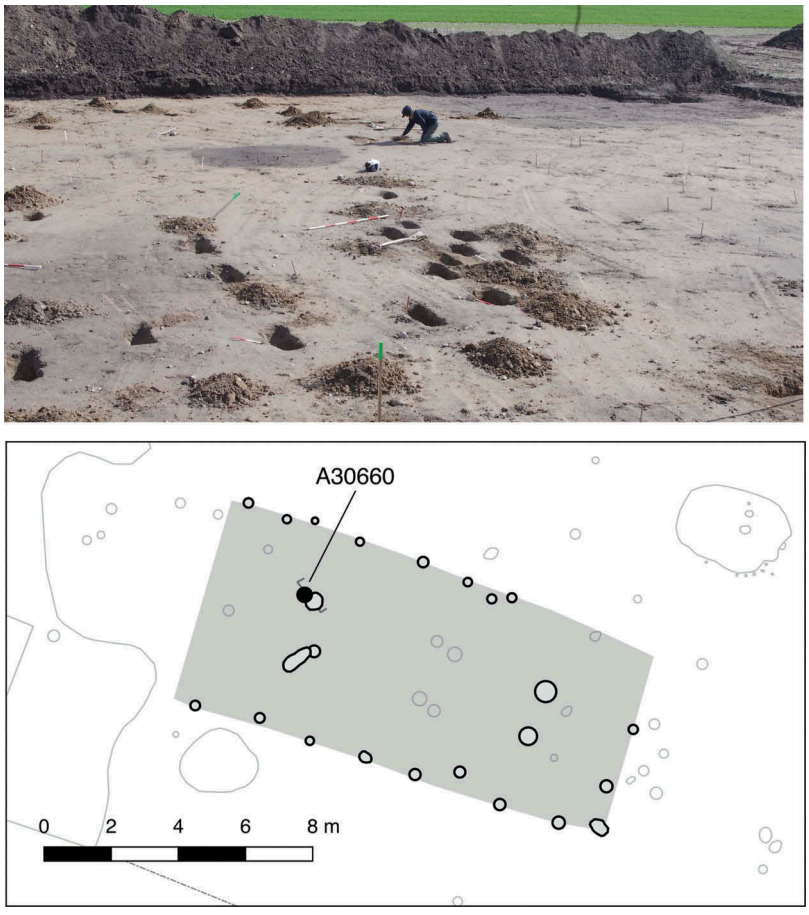

Figure 2. Translation of material remains into archaeological data in the excavation at Strøby Toftegård. At the top, the longhouse K314 during the excavation. The excavated house K314 is in the foreground. At the bottom, the excavation plan of K314. The posthole A30660 used as an illustrative example in the analysis is marked out (photo and drawing: Museum Southeast Denmark).

accordingly so the record can work as a substitute for the actual traces (Lucas 2012, p. 68).

Archiving, on the other hand, is the process by which the documentation and recordings from the excavation are processed, stored and shared, e.g. in central databases. The aim for the archiving process is in principle to reproduce the data from the excavation process, but it often includes its own layer of interpretation when data are transferred from field documentation to the archive (Holst 2005). Today, this process is mainly done in front of the computer. Another aim of the archiving process is to harmonise data to make it comparable and manageable for present and future research (Bowker 2005, p. 9). The archiving process creates the foundation for the excavation report where the results of the excavation are synthesised, but this part of the process is not further discussed here.

Despite its appearance, the process from excavating to archiving is not necessarily strictly linear. In practice, the relationship between excavation and archiving is fluent and dialectical. The initial recordings from the excavation are affected and shaped by the structure of the archives, in the same way as the archival structure and organisation are affected by the character of the recordings (Figure 3) (Bowker 2005, p. 14, Lucas 2012, p. 232). Even though archiving is usually done after the excavation, the increasing use of digital units with internet connection in the field makes it possible to place field recordings directly into the central archives and databases. The archiving process is increasingly moving 'into the field' and, in that way, merging the excavating and archiving processes.

The following analysis aims at investigating the temporalisation of the house by analysing the practice of the archaeological process characteristic for Danish settlement archaeology. In the analysis, the distinction between the two main operations of the

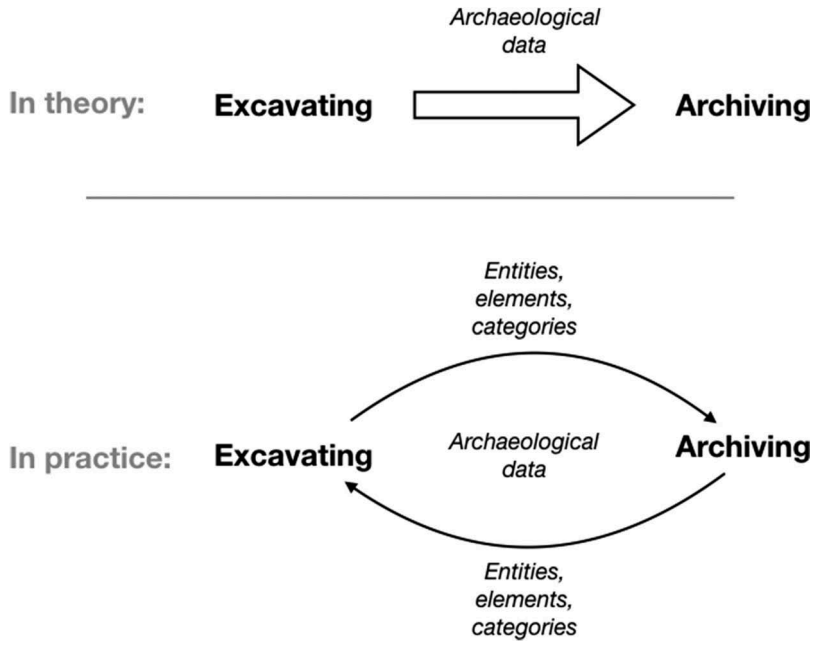

Figure 3. Schematic illustration of the relationship between the two main operations in the archaeological process, excavating and archiving. At the top, the figure illustrates the relationship in theory, where archaeological data are created in a linear process from excavation to archives. At the bottom, the figure illustrates the relationship in practice, where the entities, elements and categories used in excavation define the structure of the archive and vice versa and together create the archaeological data in a dialectical process.

archaeological process, excavating and archiving, will be kept for the sake of the analysis and the clarity of the conclusions. The aim of the analysis is to identify the principles of how the archaeological record is temporalised through the two processes, which will serve as basis for a more general discussion of the principles of temporalisation and the possibilities for a multitemporal approach to the archaeological record.

The analysis will explore the techniques and principles of the excavation and archiving of archaeological data, beginning with an analysis of the existing practices followed by a discussion of the temporal dimensions of the archaeological record. The discussion will focus particularly on the entities used in recording and how time perspectives are represented in the archaeological data. For the sake of a cogent review, it can be necessary to go into details that at first sight might seem banal, but which can turn out to be decisive to the understanding of the temporalisation process. As many practices are taken for granted in settlement archaeology, a fruitful way to create awareness of them is by describing in detail what is actually happening in the process.

To exemplify the archaeological process in the analysis, I will use one particular posthole (A30660) from a longhouse dated to the Late Iron Age to illustrate the process from excavation to the archive. The posthole A30660 was excavated in 2013 at the site Strøby Toftegård (Beck 2014). A30660 is part of longhouse K314 that archaeologically consists of 25 postholes in total, originating from the foundations of the roof supporting construction, the gables and the outer walls (see Figure 2). A30660 is the hole dug for one of the roof-supporting posts. All archaeological features constituting K314 were excavated and documented. There is nothing extraordinary about A30660 or K314, and therefore they serve well as examples of the 'standard' archaeological process.

Excavating the posthole

The excavation process in Denmark is centralised with the majority of excavations (the developer-funded excavations) being administered by the Agency for Culture and Palaces based on common standards, budget models and strategies used in all excavations (Slots- og Kulturstyrelsen 2017). It is therefore meaningful to talk about the archaeological

process as rather uniform even if local variations and traditions do exist.

Most settlement excavations are executed as open-area excavations. This excavation technique, introduced by archaeologist C. J. Becker in the 1960s at the excavations of the Iron Age village at Grøntoft (Becker 1966, 1971), changed the character of archaeology from small and narrow excavation trenches uncovering one house at a time to instead uncover large areas including complete villages and settlement complexes (e.g. Hvass 1983, 1985, Ejstrud and Jensen 2000, Holst 2010). Since then, open-area excavation has become the predominant approach to settlement archaeology in Denmark, as the technique fits well with the fragmented but spatially extensive character of the archaeological record.

In the excavation, each feature is recorded and excavated individually. Postholes are usually box-sectioned. Box-sectioning was introduced into Danish archaeology after the technique had been used at the excavations at Fyrkat in 1950–60 where it proved valuable to investigate not just the depth but also the angle of the original post (Olsen 1968). Furthermore, with the introduction of open-area excavations, the number of archaeological features increased dramatically, which underscored the need for efficient excavation methods. The box-section technique, less time-consuming than the traditional technique of emptying out the archaeological features and recording them, was adopted during the 1970s as a standard at all settlement excavations.

Details in the excavation process vary from excavation to excavation according to the character of the archaeology, the strategy of the excavation and traditions at the excavating institution, but the excavation process typically begins when the plough soil is stripped by machine. This process reveals the surface of the subsoil where dug features are visible as darker areas in the light subsoil. In general, the revealed archaeological record is characterised by an uncomplicated stratigraphy where archaeological features of all periods are found in the same surface with only few intercuts (Berggren 2009, p. 23).

The archaeological features (postholes, ditches, pits etc.) are identified and planned. Each identified feature gets a unique ID number. Possible constructions (houses, huts, fences, outbuildings etc.) are identified from the systematic location of features and equally labelled for identification. The construction ID is typically different from the feature ID. In the current example, the posthole is given the feature ID A30660 and is part of the house construction with construction ID K314.

All postholes in a house construction will usually be box-sectioned using a spade and a trowel. The section is normally placed in accordance with any stratigraphical relationships or, if these are not relevant, in accordance with the orientation of the house. Posthole A30660 has a stratigraphical relationship with posthole A30676. Therefore, the section is placed east–west instead of north–south, which would have followed the orientation of K314 (see Figure 2).

The section is first cleaned and photographed. Next, the layers visible in the section are identified and marked out and a drawing of the section with the identified layers is made. Each layer does not get an individual, unique context ID but instead get a number in relation to the drawing (1, 2, 3 etc.). The numbering serves to relate the layers on the drawing to the description of each layer. A30660 has two identifiable layers, layer 2 and 3 (layer 1 is related to A30676) (Figure 4).

The content of each layer is described according to colour, sediment type and inclusions. As the descriptions are made, a preliminary interpretation is typically made of the origin of each layer (post impression, primary fill, traces of the removed post etc.) as well as the role of the post in the house construction (wall post, door post, roof-supporting post etc.). If artefacts are found during the excavation, they are given unique ID numbers referred to as 'x-numbers' (x1, x2, x3 etc.) and referred to the

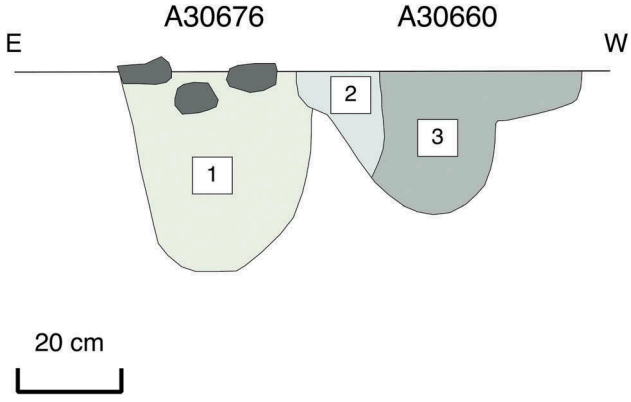

Figure 4. Section drawing of A30660 (layer 2 and 3) and A30676 (layer 1), seen from the North (drawing: Museum Southeast Denmark).

layer and feature they were found in. A30660 is interpreted as a roof-supporting posthole that contains traces of the primary fill from two events: when the post was raised (layer 2) and when it was removed at the demolition of the house, maybe with traces of the original post impression still preserved (layer 3). There are no finds from either of the two layers identified in A30660.

Finally, a soil sample from the youngest layer, preferably the post-impression, in each posthole is taken. The purpose of the soil sample is to acquire organic material suited for C14-dating to date the house. When possible, C14-datings of material from several postholes from the same house are made to support the validity of the result (Villumsen 2013, p. 20, Mikkelsen *et al.* 2016). Dates from typo-chronological interpretations, stratigraphical relations, scientific datings (mainly C14-dating) and dated finds are combined with the aim of getting as precise a date as possible. Typically, the date will be given as being within a certain time period, not as one exact calendar year, even though an exact date remains the ideal. From A30660, a soil sample was taken from layer 3 (the removed post) in which barley, rye and wheat grains were found. The soil sample also contained a large amount of burnt clay, clay slag and charcoal. The grains were not selected for dating because of the risk of contamination due to the intercutting of A30660 with the earlier posthole A30676, but grains from three other postholes in K314 were dated (Figure 5). A30660 is therefore dated on the background of the general date of longhouse K314, not in itself. Furthermore, A30660 is intercutting the post A30676. A30676 is also a roof-supporting post in K314, and A30660 must be a repair of the original roof-supporting post. A30660 belongs in that sense to a later phase of K314. K314 has been dated scientifically (670–885 AD), typologically (Late Iron Age) and stratigraphically (later or earlier than a similar longhouse in the same location [K319]). The dating confirms the house as part of a settlement unit within the large Late Iron Age and Viking Age settlement at Strøby Toftegård (Tornbjerg 1998, Beck in press).

The excavation process defines the entities in the recording of the archaeological record in both theoretical and practical contexts. According to the excavation tradition in Danish settlement archaeology, there are four separate entities in the archaeological record – finds, layers, features and constructions – but only finds, features and constructions are given individual ID numbers. Layers are not recorded as unique entities, and other stratigraphical observations as interfaces and cuts are not numbered or recorded at all (Felding and Stott 2013, p. 33). The organisation of the recording system implies the existence of a hierarchy among the entities recorded, where the stratigraphical layer is subordinated to other entities and seen as (1) a container of finds and (2) a property of the feature rather than as an archaeological phenomenon in itself (Larsson 2006, p. 36, Berggren 2009, p. 24, McAnany and Hodder 2009, p. 5, Lucas 2012, p. 79). Interfaces and cuts are at best seen as properties of the layer but typically are not seen at all.

The hierarchy among entities has implications for the temporalisation of the archaeological house. When layers and other stratigraphical entities are not recognised as separate entities, the temporality inherent in the sequence of the events they represent is easily downplayed and overlooked in the temporalisation of the house. The chronological date of the

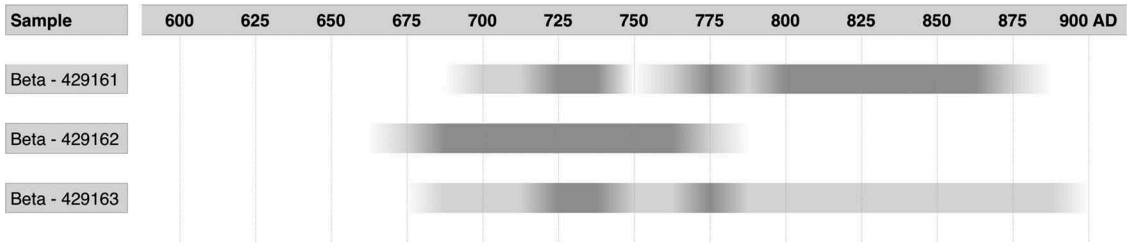

Figure 5. C14-datings of samples from K314.

Beta – 429161 (P168, A30676): 690–750, 760–885 AD (95%)/725–740, 770–780, 790–870 AD (68%)Beta – 429162 (P163, A30665): 670–775 AD (95%)/680–770 AD (68%)Beta – 429163 (P170, A30687): 680–880 AD (95%)/715–745, 765–775 (68%)Darker areas = 68% probability; lighter areas = 95% probability.

posthole becomes the most obvious, and often the only, way to record the temporal properties of the house.

As described, the posthole is typically dated on the basis of artefacts, organic material and stratigraphical relations. But what is actually dated in the process? Artefacts and organic material originate from layers within the posthole rather than from the posthole itself, even when the posthole only contains one layer. In the same way, stratigraphical relations are defined by the intercut rather than the posthole as such. Both layers and cuts are directly related to events in the history of the posthole, and, in principle, when taking the usual source-critical issues of dating into account, the date of the finds or stratigraphical relations will therefore date the event rather than the posthole per se. In practice though, chronological dates of finds or relations are more often referred to as general date for the posthole and the house to specific events and actions in the history of the house.

In conclusion, I will claim that the conventional use of dates from specific stratigraphical entities in the posthole as general datings of the house is a direct consequence of perceiving layers, interfaces and cuts as properties of the posthole rather than as individual archaeological phenomena. The temporalisation of the house is in that way influenced directly by the practice of recording and clearly mirrors a perception and recording of the archaeological house as an object rather than as a process. When the excavation process does not support the recording of events and processes, the chronological date becomes the dominating mode of temporalising the archaeological record.

Archiving the posthole

In the archiving process, the data produced in the excavation process are processed and archived, so it can be used as basis for the excavation report and in future research. The main database used in Danish archaeology for archiving archaeological data is Museernes Udgravningsdata (MUD), which is used by 25 out of 27 archeological institutions in Denmark and serves in that way as an image of the standards in Danish settlement archaeology.

MUD has been in use since 2007 (Larsen 2007). Since it was launched, only minor corrections following specific wishes from the institutions have been made (current version: 1.0.0.121). The aim of the database is to provide each museum with safe storage of excavation data as well as to improve the efficiency and homogeneity of the archaeological data (Larsen 2007, p. 28, MUD 2014, p. 7f). Each museum only has access to data from their own excavations.

The structure of the database is site-based, and comparisons between excavation data across different sites cannot be made directly in the system. Connected to each site, every excavation campaign has a set of data lists. Records of the typical open-area excavation include tables of features, finds, photos and drawings, respectively, which are used to archive the excavation data. In the context of this analysis, I will limit my analysis to the feature table and in particular how temporal properties are recorded in this table.

Each numbered archaeological feature has a unique entry in the feature table. The attributes in the description are listed in Table 1. The fields *Campaign-ID, Feature-ID, Main type of feature* and *Start date* are mandatory and these fields constitute the absolute minimum data connected to each feature. The fields *Subtype of feature, End date, Phase, Description* and relations within the database are optional. All fields are in general used for what they are prescribed for, but as the data type of some of the fields are based on free text, there is a possibility for them to be used in alternative ways, if needed.

The fields Start date, End date, Phase and Description are particularly relevant to the temporalisation of the house. The starting date has to be chosen from a predefined list of culture-historical periods (e.g. Prehistory, Iron Age, Germanic Iron Age, Late Germanic Iron Age), with a dating range stretching

Table 1. Fields included in the Feature table in MUD and their data type.

Field	Data type
Campaign ID[a]	Date
Feature ID[a]	Unique number
Main type of feature[a]	Predefined types
Subtype of feature	Free text
Start date[a]	Predefined periods
End date	Predefined periods
Phase	Free text
Description	Free text
Related features	Database relation
Related finds	Database relation
Related photos	Database relation
Related drawings	Database relation

The fields marked by a are mandatory, the rest is optional (translation by author).

from Early Palaeolithic to Present. If the material cannot be dated to any of the predefined periods, then Undated can be chosen as starting date. When archived in the database, the feature is thereby automatically given a temporal property, which places the feature in relation to the conventional culture-historical periods.

All additional descriptions of the temporal properties of the posthole are optional. The End date is mainly used when the culture-historical date stretches over more than one period but is otherwise organised exactly as the Start date and incorporates the same predefined periods. The Phase field can be used to give a feature a more precise date in relation to the internal temporality of the site (MUD 2014, p. 44), but I have rarely seen this field in use even if it might have been relevant. The Description field is open for a more specific description of temporal properties, including stratigraphical observations and the biography of the posthole (e.g. primary post impression, secondary cuts, post being pulled up etc.). The Description field is based on free text, but most museums have defined their own minimum standards of what should be recorded here and how it should be structured.

Posthole A30660 is registered in the database as belonging to excavation campaign '17–04–2013', and '30660' is the unique feature ID of the posthole. A30660 is described as a 'posthole' (main type) and 'roof-supporting post' (subtype). Furthermore, it is given a starting date, 'Late Germanic Iron Age', and an end date, 'Early Viking Age' (based on the general dating of the longhouse). The 'Phase' field is not used. In the Description field, A30660 is described as follows:

> Depth: 27; Diameter: 54; Sides: uneven; Bottom: rounded; Fill: 2: dark black-brown sandy clay with inclusions of charcoal and subsoil (original cut); 3: Light brown-grey clayey sand, small inclusion of brown-grey clayey sand, a few small inclusions of red burnt clay (backfilled trace of post), posthole is stratigraphically later than A30676 (also part of K314); Interpretation: roof supporting post; Excavation method: boxed, soil sample taken (P161). (Author's translation) (Figure 6)

In the archiving process, the archaeological data are standardised and fitted into the existing database structure. Even though based on the recordings made in the excavation process (e.g. the entities), it is the structure of the database that to a high degree defines the final temporalisation of the archaeological data.

In MUD, the temporal property of the posthole recorded is first and foremost a date in terms of

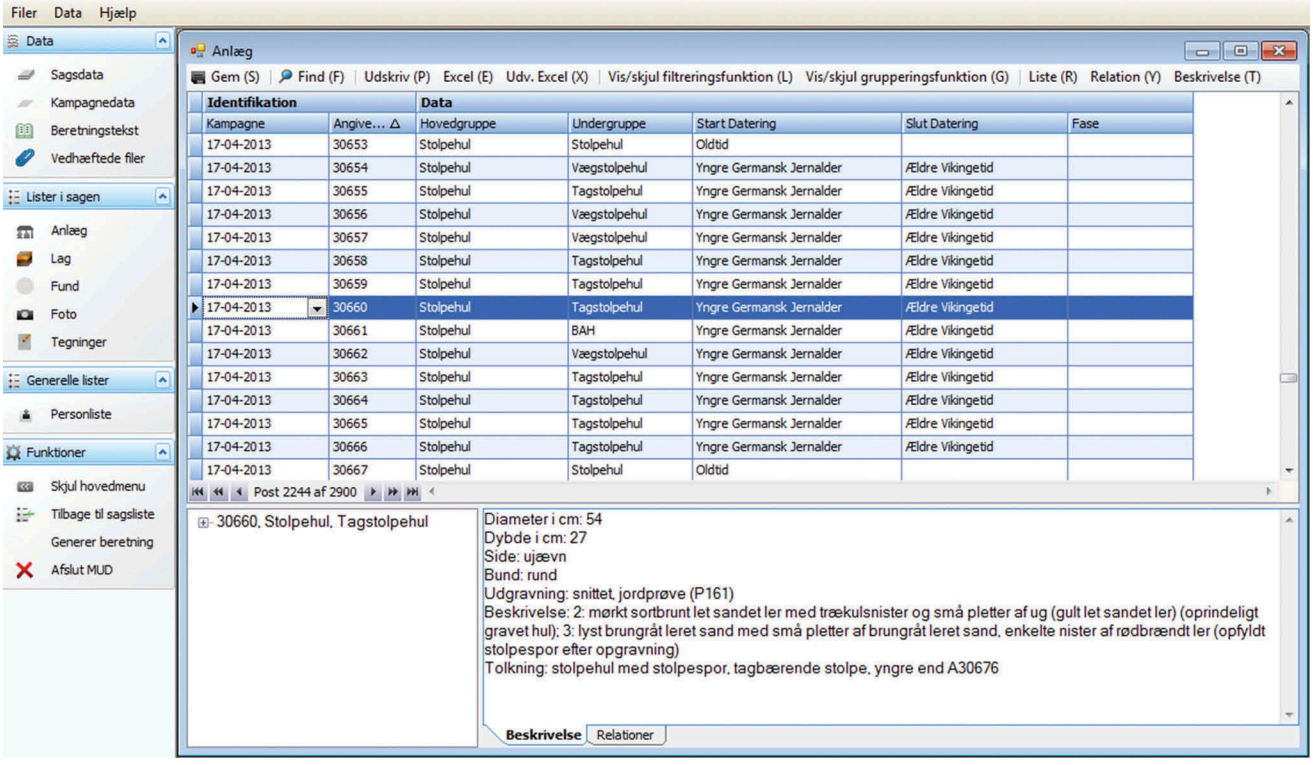

Figure 6. Screenshot from the Feature table in MUD and the recording of posthole A30660.

conventional culture-historical period. A chronological date is mandatory for all posts in the database (even if the date is Undated). All other temporal qualities, such as scientific datings, artefact datings, stratigraphy, phasing, biographical observations etc., can also be recorded in the database but are optional and must be described in free text in the Phase or Description fields. As a consequence, alternative temporal properties to the broad chronological date as well as scientific, and often more precise datings, are subordinated the conventional culture-historical periods, not vice-versa, which influences the temporalisation of the house.

Some archaeologists might argue that they are already including events as they interpret the posthole and the origin of the individual layer (primary fill, post impression, exchange of post etc.), but it is a fact that such interpretations have not had any major impact on how houses are interpreted within settlement archaeology in Denmark. As long as interfaces are not recorded on the same hierarchical level as layers, and as long as the recording of events is not formalised as part of the archaeological process, it is still up to the individual archaeologist whether to engage with the temporalities of the archaeological record or not. The general focus in this sense is still on the object (the posthole, the house) rather than the process and the archaeological events (building, using, demolishing).

Furthermore, there is no formal recording in the existing structure of the database of the dating methods used in relation to the single culture-historical period recorded as Start date (and End date). This is the case even though the dating process often combines different (and sometimes contrary) datings from typology, dated finds, stratigraphy and scientific datings and thus ought to be the conclusion of a longer argument. It can be argued that the argument can be described in the Description field as there is no formal limits of what can be recorded here, but in my time as a field archaeologist I have never seen the dating method recorded.

All in all, the data structure affects the archiving process and thereby also the temporalisation of the archaeological house through the recording of temporal properties of the posthole. Even though free text fields open up the possibility of using MUD in alternative ways, my analysis shows that the use of the database for archiving is often rather conservative. The difference in how temporal properties are recorded defines a hierarchical relationship between different forms of temporalisations, where some appear as primary and other as secondary. The formal and mandatory role the conventional culture-historical dating has in the database makes the chronological dating the primary temporalisation of the archaeological house, whereas other temporal properties appear secondary and for the most part hidden in the free text of the Phase or Description fields.

Discussion

The analysis of the archaeological process shows how the typical archaeological process within Danish settlement archaeology favours a temporalisation of the archaeological data based on the chronological date, in many cases represented by the conventional culture-historical periods. Since the first chronological theories were presented, the purpose of developing the chronological system has been to develop a framework for organising and systematising the past, to 'create order in chaos' (Thomas 2004, p. 61ff, Witmore 2013, p. 130). The same logic directs the temporalisation of archaeological settlement data, where the temporalisation is aimed at dating the house to place it in the right culture-historical context rather than untangling the single events in the house.

But if the temporalisation of the house through the archaeological process consists exclusively of fitting it into a chronological framework and other temporalities are downplayed, there is a severe risk of not thinking about the house – and in a wider perspective the archaeological record – as a temporal phenomena in other aspects than its age (Lucas 2005, p. 40; Olivier 2011, p. 57). In the end, a simplified perception of the house is created, as the temporality of the house is reduced to (1) being there and (2) disappearing at a certain moment in time. The dynamics in between are not described or engaged with, with the result that the house is presented as a static phenomenon (Sørensen 2015, p. 92, Van Oyen 2015, p. 74, Bille and Sørensen 2016, p. 6). The house is, with the words of Adams and Adams, reduced to a 'dating fossil' (Adams and Adams 1991, p. 163). It can help to place a site within a certain chronology but is not something that contains a dynamic life history of its own that can contribute to the general interpretation of the site.

For a richer understanding of the house as an archaeological and cultural phenomenon, I will follow Lucas (2005, p. 25) and argue that a broader and more inclusive perspective that actively engage with the temporality of the archaeological record is needed. Instead of seeing the stratigraphy as a property of the posthole, the posthole should be seen as an *assemblage* made up of the events and materials that created the stratigraphy.

An assemblage is a well-known term within archaeology, where it traditionally designates a collection of similar artefacts or a collection of contemporary artefacts that form a specific context, e.g. the equipment of a burial (Lucas 2012, p. 193ff, Hamilakis and Jones 2017, p. 77). But the concept of the assemblage has recently been reintroduced with the presentation of assemblage theory to archaeology (e.g. Lucas 2012, Bille and Sørensen 2016, Hamilakis and Jones 2017). Assemblage theory has its roots in the works of the philosophers Gilles Deleuze and Félix Guattari but has since been developed further into an analytical tool by Manuel DeLanda (Deleuze and Guattari 2005, DeLanda 2006, 2016). In its new meaning, an assemblage still designates a collection, but, instead of a homogeneous group of artefacts, it is a heterogeneous collection consisting of both tangible and intangible elements as well as the relations between the elements. The assemblage of the posthole will accordingly, among other elements, include the soil, the backfill, the post, the tools, the building, the people who dug the hole as well as the actions around and the intentions for the establishment of the posthole. Essentially, though, the assemblage exists only as a result of the specific situation and composition of the assemblage and changes over time, as the elements and their internal relations change.

Use of the concept of the assemblage as an analytical tool changes the perspective from a conventional top-down to a bottom-up perspective (DeLanda 2006, p. 32). Where a top-down perspective is represented, e.g. by the use of the category 'posthole', which imposes a specific concept onto the archaeological record even before it is excavated, a bottom-up perspective is represented by a focus on the processes that produce the archaeological record building the perception of the archaeological record up from the processes and materials present. Or in other word, the posthole is only a phenomenon recognised by the archaeologist. To the people creating the posthole, it was the events and actions in relation to the posthole that defined its existence. Thinking of the posthole as an assemblage helps us as archaeologists to get beyond the term posthole and creates explicit space for perceiving the posthole simultaneously as an object and a process in connection with its components (Bille and Sørensen 2016, p. 7, Hamilakis 2017, p. 173, Hamilakis and Jones 2017, p. 82). This produces an immensely fruitful perspective in relation to the understanding of the house because, as the anthropologist Tim Ingold (2010, p. 161f) rightly has pointed out, building is not only an object, it is also a verb; it is something you do.

Therefore, returning to the posthole A30660, how would it contribute to the understanding of the longhouse K314 if A30660 was looked at as an assemblage? First of all, the purpose of digging the posthole is clear. The post raised in A30660 was an exchange of the original roof-supporting post (A30676) in the western end of the house. The other roof-supporting post in pair with A30676 was also exchanged and it seems obvious that the exchange happened at the same occasion as part of a larger repair and maintenance of the house. The digging of the hole and raising the post was probably a relatively quick process as it must be assumed that it was done while the rest of the house was still standing. It was probably members of the household who were involved in the digging of A30660 and the raising of the new post using tools that were part of the inventory of the house.

The establishment of A30660 tells us something about the longhouse K314. Somebody cared for the house and had a wish to prolong its lifetime either because it was a dwelling house and somebody's home or it served a central function within the farm that was important to maintain. The wider archaeological record cannot say much about the more specific use of the house, but the fact that the house has an earlier or following phase of a similar longhouse build in the same site indicates that it could have been a dwelling, a place with a longer history and a meaning for the people living there.

The inclusions of burnt clay, clay slag and charcoal in layer 3 of A30660 (as well as in some of the other postholes) indicate that the house burnt down in the end, either as an accident or as a deliberate act. Burning down houses which are abandoned is a well-known way to clear a house site both physically

as well as mentally and could have been part of rituals used in relation with the abandonment of the house (Tringham 2000). The shape of the secondary cut in the posthole indicates further that the remains of the house were removed deliberately after the fire which support the interpretation of the burning down of the house as a deliberate act. The house had to be completely removed. Such an act must have involved at least the household of the former house but could very well also have involved other households in the settlement participating in a common ritual marking the change.

Thinking of the posthole as an assemblage leads to specific questions that even though they cannot always be answered, they cause important reflections in relation to the understanding of the house. The result is, as I see it, a richer idea of what the longhouse K314 once was based specifically on the archaeological record present today. It has even given a little impression of the inhabitants of the house that would not have emerged from a single date. If the rest of the postholes were looked at in the same way and included in the interpretation, it is possible that even more details could be given.

Assemblage theory makes the temporality of the posthole explicit. It gives the posthole an inherent dynamic, rhythm and duration at different scales (Olivier 2001, p. 66, 2011, p. 166, Lucas 2005, p. 41, Hamilakis 2017, p. 173ff, Hamilakis and Jones 2017, p. 82). A multitemporal approach to the archaeological record gives renewed possibilities of thinking in alternative temporalities within already existing approaches as chaîne opératoires, biographies or social memories in relation to the house (e.g. Gerritsen 1999, Tringham 2000, Boivin 2008, Stenholm 2012, McFadyen 2013, Bille and Sørensen 2016, Eriksen 2016). Each action, e.g. digging the hole, preparing the post etc., must be seen as meaningful actions in relation to the history of the house (Pauketat and Alt 2005, p. 223). Ideally, these are not interpretations that should be added after a basic recording of the posthole but thoughts that should be reflected upon during the excavation and recording of the feature. The aim must therefore be to work towards developing archaeological practices that better reflect the multitemporality of the archaeological record than is the case today (Bailey and Simpkin 2015, p. 188). In a Danish context this could be accomplished, for instance through an adaption of some of the elements of single-context excavation e.g. by the simple operation of giving layers and interfaces individual numbers and descriptions so they are acknowledged on the same level as other entities (Harris 1989). In other traditions and other kind of archaeology, other adaptions might be more relevant.

Conclusions

In the article, I have analysed the archaeological process typically used by archaeologists working with Danish settlement archaeology and argued that there is a problem with the temporalisation of the archaeological record. The problem is not with dating or chronology per se, but with the predominant position of the chronological date, which leaves little space for alternative temporalities.

Even if only a short critical review of how the chronological date is dominating the archaeological process can be given here, what has been learned from the analysis and discussion is that while a perception of the archaeological record as objects is dominating the current practice, the archaeological record is more usefully understood as fundamentally multitemporal (Lucas 2005, p. 43). The current archaeological process within settlement archaeology is in this way reducing and simplifying the temporality of the house by focusing one-sidedly on the chronological date and ignoring other temporalities. Instead, a perception of the archaeological record as assemblages gives the possibility of including perspectives of the archaeological record both as material objects as well as processes which in the end can contribute with a more complex and richer understanding of the house as an archaeological and cultural phenomenon.

The debate about temporalities of the archaeological house should be viewed not only as a theoretical debate but also to a great extent as a question of practices that reaches deep into the foundations of settlement archaeology. Archaeological data and archaeological practice can hardly be separated, and the archaeological data created will always constitute the point of departure for the archaeological research. The detailed review of the practices used in Danish settlement archaeology can in that way serve as an example of the close connection between

theory and practice and hopefully inspire to similar review in other traditions.

The aim of the paper has not been to argue that archaeologists should replace the chronology with a new temporal system but rather that we need to go beyond the chronology and complement it with more complex temporal perspectives. The article is therefore not a critique of chronology as a framework or of archaeological work done previously, but a critique of the lack of reflection over the dominant position the chronology has in and because of existing archaeological practice. More than anything else, the article should be seen as a call for a more extensive debate of the basic methods and practices and their relevance to the archaeological data produced in relation to the questions asked. In the end, if the archaeological data do not express a complex temporality, neither will the questions investigated.

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RESEARCH ARTICLE

From tribute to taxpaying: the changes in the understanding of private property in Denmark circa 1000–1250

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ABSTRACT

The focus of the paper is about how the concept of property and the possession of land changed in Denmark from c. 1000 to 1250. Until the mid of the twelfth century, we are mostly depending of the archaeological material and the few narrative sources, and they give an impression of a system where various persons could have rights and claims to the same landed property – the farmer who cultivated it, the local lord who had a right to tribute, and his lord – the king. This system was challenged when the Church was established in the eleventh and twelfth century and started to get large donations. The Church claimed full property right the donated land, something that lead to conflicts, and one response was the introduction if written laws with firm rules about transfer of landed property and ownership. The introduction of firm rules did not mean that kinsmen stopped questioning donations or sales of land to ecclesiastical institutions in the thirteenth century, but rather that the conflicts were legalised

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In this paper I will venture out into very deep waters, not only trying to combine written and archaeological sources, but also trying to present a theory about how the concept of property, or more precisely the possession of land, changed in Denmark from the period often referred to as the Viking Age to the first half of the thirteenth century, when all the three provinces of the kingdom got written laws.

In the provincial laws' chapters on the transfer of property, we clearly see that they operated with an absolute concept of land possession – probably inspired by Roman law – even though the modern meaning of the word *ejendom* (property) had not yet found its way into the Danish language, and the laws talk about 'holding' rather than 'owning' (Fenger *et al.* 1982, Fenger 2000, see also Iversen 2011). But in the Law of Scania, probably written between 1202 and 1216, it was stated that it was possible to convey land to eternal possession (*Wærulzskøt*, literally meaning 'conveying for as long as the world exits' (Brøndum-Nielsen and Jørgensen 1933); see also Tamm and Vogt 2016). The Roman concept of absolute ownership to land was probably introduced into Denmark via the Church, which claimed full property rights over donated land.

In this context, the first question to ask is: What do we know about land structures and possession in Denmark in the Viking Age and early Middle Ages? The first part of the question is easy to answer. Archaeological excavations have shown the existence of villages, single farms and magnates' residences. But who owned the land: those who lived on it and cultivated it, local magnates or the king? This is discussed below.

Excavations have shown the existence of magnate or maybe royal residences (*kongsgårde*) from the Iron Age and the Viking Age in, among other places, Tissø and Lejre in Zealand. This clearly indicates that there was a group in society that benefited from the work of others, though it is not clear in what way. In Lejre, there are many traces of large-scale agricultural production (Christensen 1991), while at Tissø, vestiges of agricultural production are scarce. Part of the income at Tissø must have come from a seasonal market of which traces have been found, but that alone does not explain why there are indications that there was great storage capacity in the area. Lars Jørgensen initially suggested that the storage buildings were used for grain and other agricultural produce which the lord of Tissø received as tribute from the farmers in the

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area, which was why there was no need for large-scale agricultural production at Tissø (Jørgensen 1996). It is this idea of a tribute system that has prompted the idea that is the topic for this paper.

Subsequently Lars Jørgensen modified this picture. In an article, in 2001, he suggested that there were three phases in the economy of the magnate residences. In the first phase, tribute was the most important source of wealth, while in the eighth or ninth centuries, the magnates' economy became more influenced by their own agricultural production. The third phase, which took place in the high Middle Ages, consisted of the development of a manorial structure with tenants (Jørgensen 2001, pp. 73–74). If as Lars Jørgensen argues tribute gradually started to be replaced by the magnates' own agricultural production in around 800, why does the title of this paper refer to tribute at around the turn of the first millennium? Jørgensen proposes that tribute and agricultural production were not mutually exclusive. This is why there may be no contradiction between tribute – duties paid regularly by free farmers as a kind of tax – and domestic agricultural production on magnates' estates.

'Tribute' is a word archaeologists often use for the payment of duties to a lord or a king, but as the Danish historian Bjørn Poulsen has shown is it often difficult to distinguish between when a form of payment was called a gift, tax or tribute, in the Danish sources from the early and high Middle Ages (Poulsen 2011). Poulsen's work is very interesting because it illustrates the problems of trying to apply precise legal terms to a time where the concepts had not been developed, and the danger of interpreting the existence of a legal term in a source as evidence of learned legal thinking. As Chris Wickham has shown, this also applies to Anglo-Saxon England. The use of Roman legal terminology in the charters from around 700 cannot be taken as a proof that the legal concepts were understood in the same way as in classical Rome (Wickham 2005, p. 347).

Even though it can be questioned whether 'tribute' is the historically correct term, it is used here in the absence of a better word. Here, 'tribute' is defined as: Duties paid by the rural population to a lord for protection or in recognition of his suzerainty; the lord in turn could pay tribute to a king for the same reasons. 'Tribute' is a better word for these transactions than 'taxpaying', if used of a time where a royal tax system based upon land possession had not been developed.

This concept of the functioning of the tribute system is hardly controversial. It is shared by several Danish archaeologists, and Chris Wickham argues for the existence of such a system in Anglo-Saxon England, which supports the idea that it also existed in Denmark where he finds many of the same patterns as in England (*ibid.*: 321, 323, 371–373). The model for the payment of tribute presented here is of course an idealised model, used to explain the different claims on the usufruct of the land.

Most of the magnate or royal residences that had existed during the later Iron Age and the Viking Age were abandoned in the eleventh century; the majority of them were moved to new locations where new manor houses was constructed. Why? One answer could be that the magnates not only held their positions through financial and military power, but that they also played an important role in the pagan religion. The finding of sacral areas and sacrifices connected to the magnate residences could indicate this (Jørgensen 2009). The introduction of Christianity would have changed the magnates' roles with regard to religion, and it may have been problematic for them to continue to reside in a place that was closely connected with paganism. It may also have been a consequence of the changed functions of the magnates, so that the construction of a farm with a great hall at its centre lost its importance and they chose to move to smaller more exclusive manors, to places there were easier to defend or maybe there was simply a change in the fashion for aristocratic living.

What does the existence of a tribute system say about who owned the land? Was it the farmer who cultivated it and who could pass on the farm to his children or other relatives, the lord who had a right to collect tribute, or the king? Did it matter who owned the land – understood as having the unchallenged right to dispose over it – as long as all those who benefited from it agreed about the division of the rights? Serious problems only arose when land was taken out of this context by being transferred or sold to ecclesiastical institutions, which had a quite different and absolute definition of property, rooted in the Roman law. Furthermore, some monastic orders even went as far as to break up the farming

structure and replace it with *grangia* production. Briefly, *grangia* production was a form of production based on the dissolution of smaller production units, often one-family peasant farms, and combining them into huge units for large-scale farming. In *grangia* lay brothers, not tenants tilled the land, why the former farmers and their families had to leave the land.

Studies of early medieval charters mentioned in the donation books of Danish monasteries, especially Esrom Abbey a Cistercian monastery in Northern Zealand, support the theory that the concept of land ownership was vague and that exclusive property rights were new to Denmark in the twelfth century and had not won widespread recognition. Generations later the kin or descendants of vendors or donors might claim the land that according to the monks had been sold or donated to the monastery. The kinsmen could claim the land on the grounds that they had not agreed to the transaction or that it was against the laws and customs of the province or realm, these claims were taken seriously and often the donation, or sale was then renegotiated. At the same time, there seems to have been some confusion about the rights attached to land that a king had bought and later donated. Did the heirs of the king (whether the same king or his successor), the seller's heirs or the monastery have the right to the land? The letter books reveal that it was not uncommon to donate or sell not only farms but entire villages to a monastery, which tells us that there were magnates or kings who claimed to own land that was not tilled as a large-scale operation, but which they nevertheless claimed to own.

The problems for Esrom Abbey in upholding the property rights to its estate have been examined in detail by the Danish historian Kim Esmark (Esmark 2004). He has interpreted the conflicts in a legal anthropological context, since his aim was to investigate the conflicts in a broad sociocultural context and thereby get some glimpses into the understanding of law, politics, the economy and social structures. If one looks at the material to see what it says about property rights, it can shed some light on the transformation of the understanding of land-owning in twelfth century Denmark.

In the charters, the Latin[1] term *calumnia* was used about lay peoples' claims over land held by ecclesiastical institutions. *Calumnia* means a false legal claim, and it is the standard term used for that kind of claims.[2] Some examples from the Esrom Abbey donation book will be presented, and through them, an attempt will be made to give a picture of conflicts about ownership of land and what these conflicts say about the understanding of property rights in the mid-twelfth century.

The Cistercian Abbey of Esrom was founded in the 1150s by the Archbishop of Lund, Eskil. The first example of challenges to the abbey's possession right goes back to the foundation of the Abbey. A man had sold land to one of Eskil's kinsmen, Count Niels, who had in turn donated it to the Abbey. After Niels' death in 1156, the man and his son raised a claim on the land (Diplomatarium Danicum, 1938–1990, 1.2:127).

How come that the seller and his son could challenge the Abbey's possession and that the challenge was taken seriously?[3] It is difficult not to see the case as expressing that the original owner did not think that selling the land to Niels was the same as giving Niels the right to transfer the land to a third party. Like most cases of challenges to the abbey's possession, this one ended with a compromise. On the day of the consecration of the high altar in the Abbey church in 1158, the seller and his son donated the land to the Abbey and thereby obtained a share of the monks' intercessions, and made the monks and their patron saint – the Virgin Mary – their friends (White 1988). Only then was the Abbey's ownership of the land fully recognised.

In around 1150, Eskil had bought the village of Villingerød from a dean of the chapter in Lund, and later donated it to Esrom Abbey. The dean had inherited the land from a kinsman who had got it as a gift from King Erik III (*DD* 1.2:184). Eskil, who may have been unsure about the validity of the sale, got no less than two royal confirmations of the sale (Esmark 2004, p. 153). The first was given by King Svend Grathe between 1151 and 1157 (*DD* 1.2:107), and the second by King Valdemar I in around 1160. In Valdemar's charter, it is written that the king feared that either the heirs of the seller or future kings would challenge the Abbey's right to the village. To prevent this, Valdemar stated that King Svend had not only confirmed the donation, but also had actually donated the village to the Abbey with all royal rights. This donation was repeated by Valdemar, this time for the sake of

his own salvation and that of his kin (*DD* 1.2:129). Valdemar's double donation in both Svend Grathe's name and his own is very interesting, because it shows that rival claims to the village existed. As royal land, the king could give it away or sell it, but it was doubtful whether the sale or gift bound successor kings. When Valdemar wanted to relinquish whatever royal claims there were on the village (perhaps a right to tribute),[4] he had to secure it against claims by his successors. His own line would hardly question a donation given for the soul of Valdemar and his kin, which included themselves, but the civil war had only ended a few years previously, and Valdemar may not have been sure that his line would prevail, which was why he also tried to bind King Svend's linage.

Years later, probably in around 1170 but the dating is uncertain (for the dating see *DD* 1.2:184 + 337), the grandchildren of the dean who had sold the village claimed that it belonged to them according to their right of inheritance (*hereditario iure possidere debuerat*). Again, the claim ended in a compromise; the heirs conveyed the village to the Abbey, partly as a donation, and partly against a gift (*DD* 1.2:184 + 185). After a period of over twenty years, the ownership of the village was finally settled. This example shows how rival rights to the same village were negotiated and settled by compromise. Except for right of inheritance, there is no mention of legal rules and clearly there was no consensus about the grandchildren possessing that right.

The right of disposal over royal land is the theme for next example. In his letter of confirmation between 1151 and 1157 (for the dating see *DD*. 1.2:107 + 196) regarding Eskil's donation of the village of Esrom to the Abbey, King Svend Grathe noted that he gave the confirmation even though Eskil did not own the village, since he had got it as *precarium*[5] from Svend's predecessor, Erik III. Therefore, the donation, 'despite how it had been performed legally',[6] did not grant the monks possession of the village, which was why Svend Grathe donated the village to the Abbey – not for prayers and not for money, but because it would be for the benefit of the salvation of many (*DD*. 1.2:107). This case shows the uncertainty about the right to dispose royal land. Eskil clearly thought that he had got possession of the village, when and how it is impossible to know, but it could have been either when he received the village or through the abdication of Erik III, while Svend Grathe still considered Eskil's right to the land to be limited and personal.

The next example shows that royal gifts as well as other gifts could be questioned. After he had become sole ruler in 1157, King Valdemar donated one half of the village of Såne to Esrom Abbey. Såne used to belong to the kings, but according to the donation charter, it had been sold by one of Valdemar's predecessors. At the time for the donation, half the village was owned by a Peder Lagesen from whom Valdemar bought it, where after both the king and Peder Lagesen donated half the village to the Abbey (*DD*. 1.2.122; Fenger 2000, pp. 257–284, especially 265).

Almost 20 years later a man named Peder Scalle raised a claim in respect of half of the village of Såne, claiming that it was a part of his *patrimonium*. (Knudsen 1988) The sources do not reveal who this Peder Scalle was and why he raised the claim. Kim Esmark has suggested that he could have been the son of a brother of Peder Lagesen (Esmark 2004, p. 156). Whether he had his claim through kinship with Peder Lagesen or some other former possessor, the claim was taken seriously. In Valdemar's donation charter, it is written that Valdemar bought the village from a Peder Lagesen, 'who might have possessed it at that time'.[7] This could indicate that there had been other possessors or that Peder Lagesen's possession was challenged.

It took years to get a compromise, but in the end Peder Scalle conveyed and donated the village to the monks, first over the altar in the Abbey church and later over the high altar in Lund cathedral (*DD*. 1.3:45; 1.3:46). The king and a great number of bishops and magnates were present in Lund, and the way in which the charters emphasise that he did so of his own free will prompts the suspicion that pressure had been put on Peder Scalle to enter the compromise.

There are more examples of claims on donated land in the donation book of Esrom Abbey (*DD*. 1.2:130; 1.7:221.), but the above should suffice to give a picture of the state of the law. Clearly, there was a lot of uncertainty about how to get and how to keep unchallenged ownership or at least the right to use land.[8] Different claims could be raised (royal rights, rights of inheritance, sale or donation), and the various players were not more sure of their rights

than that they would ultimately enter a compromise. Very few charters on land conflicts have been preserved from the twelfth century, and all of these concern donations to ecclesiastical institutions. What has been preserved is probably just the tip of the iceberg, and the twelfth century must be seen as a transformative period during which the older understanding and definition of rights over land were replaced by a new understanding and definition.

This development is not just something that can be seen in the Danish material from the early Middle Ages; it can also be seen in the former Frankish realm. The Danish material is more recent than that seen in most of continental Europe, probably due to its late Christianisation and the lack of sources dating from before the 1150s. In France, donations and sales to ecclesiastical institutions were negotiated and redefined from the tenth to the twelfth centuries when they start to disappear, at about the same time as in Denmark.

The same structures are seen in both the Danish and the continental European cases, of which the most thoroughly investigated, and are those from France. Those who raised a claim on ecclesiastical land did not have a specific legal demand, but rather a moral one. The lack of a firm definition of possession of land meant that equally valid claims could be opposed to each other. Kim Esmark emphasises that to understand the claims, they should not be interpreted as capricious attacks on the Abbey's rights but as different and overlapping claims that arose 'in a society without a formalised legal order that is a society where prevalent law and rights as a starting point not is written down as abstract universal rules, but primarily existed as moral norms, narrative examples, proverbs, colloquialism and so forth, that thereby gives room for rival and all in their context equal valid claims'.[9]

It is hardly a coincidence that the claims on donated land, known in the donation books as *calumnia* begins to disappear in the second half of the twelfth century.[10] It is in this period that we see a flowering of legal studies, which not only influenced the learned elite but also reformed the legal basis for both canon and secular law by making legal thinking scientific. This flowering of legal studies was thanks to the rediscovery of the *Digest* in the last part of the eleventh century. The *Digest* was part of the Emperor Justinian's *Corpus iuris civilis* from the 530s. In contrast to the rest of the Roman law that was known in the West, the *Digest* was not just a collection of laws but the writings of jurists who discussed legal problems in a scientific way and showed how legal arguments could be used to solve disputes in cases where the law was insufficient or ambiguous. The discovery of the *Digest* not only revolutionised the study of law, but also the use and importance of the law. No later than the 1130s a new study of Roman law saw the light of day in Bologna and it spread throughout southern Europe (Stein 1999, Brundage 2008).

In southern Europe, Roman law collections that did not need highly academically trained lawyers to use them had formed the basis of the legal system. But within one or two generations they were replaced by the *Corpus iuris civilis*. Nor was canon law, the legal system that regulated the Roman church, left untouched. Canon law had been developed through the centuries, and it consisted of a mixture of biblical quotes, the writings of the church fathers, decisions made in church councils and papal bulls. This meant that there could be many different answers to the same question, depending on which collection was consulted. Earlier attempts to standardise canon law under the Carolingians had failed, but it did not take the canonists – those who specialised in canon law – long to follow the new legal trend. Already in the 1130s, they began teaching canon law in Bologna and less than 20 years later came what became known as *Gratian's Decretum*, which very rapidly became 'the' collection of canon law. The original title was *Concordia discordantium canorum* – the harmonisation of disharmonised canons, and the name illustrates its method very well. In the *Decretum,* what appear to be contradictions are harmonised through scholastic dialectical analysis. They thereby reached reasoned solutions to theological problems that had troubled the church for centuries. The *Decretum* is highly influenced by the Romanists – those who studied Roman law – not just by their method but also by the Roman law as found in *Corpus iuris civilis*. Roman law was used as a direct source for canon law in places where authoritative theological texts were missing; the church developed its procedural system according to the Roman model, and it also used the Roman concept of property. In Justinian's

Digest, a distinction was made between exclusive ownership and a right to use, for instance, the fruits of the land. This distinction had disappeared in the West after the fall of the Western Roman Empire, and the single-term *possession* was used to describe any right to land. Yet the Romanists started with the starting point in the Digest 16.6.5.15 *Duo non possunt habere dominium eiusdem rei in solidum* – two persons cannot own the entirety of a thing at the same time – to claim that property rights could not be shared. Hence, when property first was transferred, it was irrevocable and with all rights. The distinction between full ownership and all other rights over land or movable property was gradually re-established in the twelfth and thirteenth centuries as *dominium directum* and *domininum utile* – superior ownership and the right to using property respectively, a division that influenced the law on land lease.[11]

The new scientific way of working with legal problems, with its basis in Roman and canon law, is normally called *ius commune*, which also had a strong influence in Denmark. In the twelfth century, the elite started to send their sons to continental Europe to study, especially those destined for a career in the church. Paris and Bologna were the most popular destinations, Paris for theology and canon law and Bologna for both Roman and canon law (Monumenta Germaniae Historica 1878, p. 77; Helk 1981, pp. 27–32; Sällström 1957). These young men, who eventually held high positions in the church and the chancery, brought home not only a new understanding of law and legal concepts, but also theological ideals about how a Christian prince should rule. In the twelfth century, there was an increased focus on the king as *rex iustus* – a righteous king, who should secure the peace and protect the church and the weak, and – which was very important – who should rule by law (see McSweeney 2012 for a comparison). The ideal of the king as peacekeeper and law-maker was soon to be found in Denmark (Vogt 2010).

It has been convincingly argued that around 1170 were strict rules on inheritance were introduced in Denmark probably via royal intervention, maybe in form of the Book of Succession (*Arvebogen*)[12] and the Church laws for the provinces of Scania and Zealand, the first written laws we for certain know about from Denmark.[13] Of course, it cannot be completely ruled out that there had been some earlier written law, but no trace of it has been found. As the name indicates, the main object of the law was to settle the right to inheritance. This is not surprising for several reasons. As long as there was no settled order of inheritance, each death could lead to conflicts about who had the right to the deceased's land and other belongings. Thus, firm rules of inheritance had a function of engendering peace, and one of the ideals behind the creation of the law was to strengthen the kinship rights of individuals and thereby create more a stable and peaceful society (Vogt 2010). To secure the children or kinsmen of an intestate person against the disposal of their estate, it was not enough to hand down laws on inheritance, since this only secured possession for the heirs after the death of the intestate person. However, laws on inheritance did not apply during the lifetime of a person, to prevent him donating his possessions *inter vivos* to an ecclesiastical institution or disguising a donation as a sale at a price far below its value or an exchange of property for inferior land. Not all the consequences of the new rules were foreseen in the Book of Inheritance, but it can be seen how the gaps were filled in, in the provincial laws of the first half of the thirteenth century. The provincial laws included not only rules about inheritance and donations, but also rules about kinsmen's pre-emptive rights to land, house-leading[14] and conveyancing.

In many ways, the rules in the provincial laws were a response to the transformation which Danish society had gone through from the tenth to the thirteenth centuries. Great changes had taken place. Most importantly, the church had been established and the magnates and kings saw their interest in establishing bonds with the ecclesiastical institutions, primarily the abbeys. This was not only for saving their souls, but also – at least if we can use a French parallel – because being on good terms with the patron saint and the monks gave a number of temporal advantages, as it meant being part of their network and being able to count on their support, for example, as a mediator in conflicts (White 1988, Rosenwein 1989).

To conclude, there was undoubtedly great uncertainty about ownership and how land could be sold, donated or exchanged and this may help explain why firm inheritance rules and subsequently kin's

rights to pre-emption of land and stipulations about donations were developed from the 1170s onward. As long as all the parties agreed about the rules in the continuing negotiations on the right to land and other property, the system might function and even be justified. It could be used to emphasise status and create close ties between large monasteries and magnates. But the system could not be sustained once the growing interest in Roman law and legal thinking which emerged throughout Europe in the twelfth century began to focus on property rights.

The introduction of the provincial laws did not mean that kinsmen stopped questioning donations or sales of land to abbeys or other ecclesiastical institutions in the thirteenth century, but rather that when raising a claim they took them more frequently to court, where disputes were settled either by a judgment based on the law or more likely via a compromise entered into with arbitrators whose main concern was to find a lasting solution, that could make both parties content and thereby prevent further claims from arising (Esmark 2013, Vogt 2013).

Notes

1. For *calumia* claims in the other abbeys where the donation books are preserved see Esmark (2013) or Vogt (2013).
2. Esmark suggests that in early and high medieval Europe, it was understood more neutrally as a challenge. (Esmark 2004, p. 172) I do not agree with that there is no contradiction in that the abbeys found the challenge unjust and that they entered a compromise with the one who raised the claim.
3. That the Archbishop took the challenge seriously can be seen from the privilege letter he gave to the Abbey in 1158, where in the list of the Abbey's possession he did not mention the land in question, *DD* 1.2:126; see also Esmark (2004, p. 152).
4. According to the Danish historian Svend Aggesen, who lived in the second half of the twelfth century, in the old days the kings possessed all land in the kingdom with *iure dominii* which, among other things, gave them the right to collect taxes and demand that the population participate in the construction of defences (Gertz [1917-18] 1970, p. 112).
5. Meaning either the right of use (Skyum-Nielsen 1971, p. 207), or a certain kind of loan (Fenger 2000, p. 264).
6. 'Talem donavionem legittime quidem datam' (*DD*. 1.2:107 + 197).
7. 'Qui tunc temporis forte eam possidebat'.
8. The present author does not agree with Ole Fenger, who thought that the claims were raised because the church was not a natural person but an institution (Fenger 2000, p. 266). He is probably right that the ecclesiastical institutions were not regarded as legal persons in a modern sense, but as the French materials show, the patron saint was regarded as the recipient of the donation (White 1988).
9. Esmark (2004, p. 172): 'i et samfund uden formaliseret juristik, dvs. et samfund hvor gængs lov og ret som udgangspunkt ikke forefindes nedskrevet som abstrakte almengjorte regler, men primært eksisterer som moralske normer, narrative eksempler, ordsprog, talemåde og lignende, som dermed giver plads til konkurrerende og i hver sin kontekst lige gyldige diskurser'.
10. In a letter to the Pope Innocent III in 1198, Archbishop Absalon complained that donations to the church were sometimes questioned wickedly by certain *cauillotores* (i.e. quibblers)(*DD*. 1.3:238). The last example of challenge on donated land from Esrom's donation book is from 1249 (*DD*. 1.7:221).
11. For a detailed description of the development of Roman property concepts and how the change in the interpretation of the Roman law influenced the Norwegian provincial laws, see Iversen (2001, 2011). For the process of developing a distinguish, see Rüfner (2010).
12. For the dating and editions the Book of Inheritance see Gelting (2005), Vogt (2010, pp. 46–47), Andersen (2006, pp. 80–82).
13. On the dating of the Church laws see Andersen (2014).
14. Old Danish *fledføring*, from house and lead, it was rules for how old and sick people could get support without selling their land.

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RESEARCH ARTICLE

How to define borders between private and common land in Norway?

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ABSTRACT

This article focuses upon the delimitation between the separate farm units and the collectively exploited common lands ('allmenninger') in Southeastern Norway during Medieval times. In these commons, various kind of resources – like pastures, woodland and fisheries – were accessible for exploitation by a majority of farmers in the settlement community, but subject to more restrictions than the resources of the 'outlying fields' pertaining to the separate farms. While the majority of the farmers within the community preferred that the extension of the commons should be preserved for their convenience, two groups of farmers might appropriate parts of the original common land area: those cultivating farms bordering to the common area, and who might extend their separate farmland successively into the previous commonly held area, and landless people who wanted to establish new farms ('clearances') within the common land. The legislation was also double and ambiguous. On the one hand it stated that 'the commons [should] stay in the way they have been before'. On the other hand it was declared that a farmer establishing a farm as a new clearing in the commons should become the King's tenant and thus come under his protection. The processes behind the institutionalizing of boundaries between the commons and private farm properties are highlighted through an analysis of settlement development in two municipalities/parishes in Southeastern Norway.

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Introduction

Drawing upon the medieval legislation from the latter half of the thirteenth century, as well as the legal practice during Late Medieval and early modern times, I will take as my point of departure the following definition of 'common lands' in Southern Norway:

> Territories outside the precincts of the particular, individual farms or settlement communities, which were open to resource exploitation for a selected majority of the peasants on fiscal farm units. Compared to the outlying field areas with the same kind of resources which was part of the privately owned farmlands – and which could be possessed either separately by individual farms, or jointly by two or three farms together – the exploitation of resources from the common lands was subject to much stricter restrictions and confinements.

The aim of this article is to highlight the background and conditions for the establishment of such areas considered as common lands by analysing the development of the agrarian landscape in two settlement communities in the central parts of Southern Norway. One main point of focus will lie with the processes leading up to the drawing of more clear-cut boundaries between such areas with commonly accessible resources and the lands pertaining to the individual farms being subject to their exclusive use.

The structure of this article will be as follows:

(1) first, I will outline some basic features characterizing the common lands of Southern Norway, including some inherent contradictions or oppositions within the peasant community relating to the use of common lands and the possible acquisition of parts of the commons as separate property;
(2) second, I will present some main stages in the development of Norwegian medieval legislation pertaining to common lands; and
(3) thirdly, I will delve into two examples from the central, agrarian regions of Southeastern Norway, in order to see what an analysis of settlement development might reveal about the institutionalization of a clear boundary between the common lands on the one hand and private farm property on the other. Such

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an analysis will necessarily have a retrospective perspective by trying to highlight the delimitation processes taking place during the Iron Age.

The place of extensively exploited resources within the agrarian adaptation and the role of the 'common lands'

In the southern part of Norway, the common lands must be viewed as a necessary and integral element within a balanced agrarian system which comprised both agriculture and animal husbandry (cattle). Farming was done on individual lots (homesteads) that comprised both intensively cultivated parts of land and more extensively exploited areas. The intensively cultivated parts – or 'the in-fields' – comprised both fields for grain growing and meadows for hay production. The extensively exploited area – also called 'the outlying fields' – often consisted of woodland, stony areas and other impediments, as well as pastures, where the cattle belonging to the individual farm could graze. Those outlying fields that adhered to the particular farms might either be owned completely individually or separately for each farm or as a 'joint property' ('sameie') for two to three farms together. Such a mode of subsistence had high capabilities for adaptation, vis-a-vis different stress factors, such as varying population pressure, tax pressure from the authorities and the like. In times of growing population pressure – like in the High Middle Ages – increasing weight might be laid on grain production, which allowed for a greater amount of consumable energy to be produced from the land, though it required a greater labour effort; while in times of lower population pressure, the priorities would shift back to animal husbandry, which required a lesser work amount, and was better suited to the dietary preferences among people. But the functioning of the system required that some elementary standards of balance were being met, and in such a context the common lands stood out as a necessary and highly appreciated element. They provided an extra, additional supply of potentially extensively exploitable resources that stood at the disposal of the peasants on the officially recognized farmsteads.

The use to which the common lands were primarily subjected within this agrarian context was dictated by the need for additional, supplementary resources, as viewed from the individual peasant household or farmstead: to a great extent, it concerned *additional supplies of fodder for the cattle*. Among other things, this was provided by moving the cattle in summer to certain 'dairy farms' in the commons – i.e. clearly defined and individually disposed lots around which the cattle could graze freely. At these places, the dairy produce could also be preserved and stored on a temporary basis before transporting it and the cattle back to the farm in early autumn. Furthermore, the activities providing extra fodder for the cattle also comprised cutting the hay on outlying fields in the commons (called 'utslåtter' in Norwegian) and gathering leaves and bark for fodder purposes. Apart from this, the common lands also had great value for the individual peasant households on account of their wooden resources. The woods provided fuel and building material as well as material for fences. The processing of tar, on the basis of pine roots, was also common in many districts. Finally, the rights to fishing in the lakes and rivers as well as hunting were also of great significance to the peasants concerned.

Limitations and restrictions to the resource exploitation in the 'common lands'

Contrary to what might be expected from the meaning of the Norwegian term for common land – 'almenning', which literally designates something belonging to, available for 'all men' – the exploitation of resources in these areas was not completely free, as we might deduce from historical sources so far. This had two aspects relating both to what was considered legitimate use of the resources in the common lands among those peasants who held rights to such exploitation and the extent of the peasant collective who was regarded as legitimate users.

(1) In the first place, resource exploitation in the common lands was subject to rather strict regulations and confinements, compared to how the peasants might utilize their 'own outlying fields', being part of their separate farmsteads. For instance, the outtake of wooden resources was allowed only so far as it

concerned legitimate 'needs of one's own household'. In contrast, the exploitation of the forests for other purposes, such as commercial, was considered as another question, and not allowed.

The right to cut hay on outlying fields in the commons was regulated on a year-to-year basis: The person 'who first put his scythe into an outlying field' could use the hay from the site that year, but the next year it was again free for other peasants. The practice of burning down some of the vegetation and sowing grain in the ashes (in Norwegian: 'bråtebruk') was originally forbidden in the commons, whereas one was allowed to do it in the outlying fields pertaining to the individual farms. In early modern times, however, the peasants exercised an ever greater pressure to be allowed to do likewise in the commons.

(2) Second, *concerning the extent of the peasant group holding rights to exploitation of common resources*: As far as we are able to deduce from the evidence of early modern times, the access to resource exploitation in the commons was never assigned the whole settlement community in its totality. On the contrary, the use rights were tied to farm units, which were entered in the official land registers (cadastres, 'matricules') and were thereby recognized by the state as primary tax objects or fiscal units: Such units were called 'skattegårder', i.e. 'tax farms or cadastre farms'. In some regions even this was *not a sufficient condition*, as the rights of exploitation in the commons were still denied some farms which had been settled during the Viking Age, on stony and hilly areas with poorer soil, between the older settlement cores. As has been highlighted by Andreas Holmsen, the farms of the so-called 'stokklendinger' in *Eidsvoll* parish, Romerike, were exempted from rights to the common lands (Holmsen 1966). Though the right to take up 'dairy farms' in the commons was widely recognized, this was not necessarily practised by all peasants. For instance, within the parish of Nannestad in the southeast region studied here, only some 50 out of 134 farms having official status in the cadastres used such dairy farms in the commons during the middle of the eighteenth century. However, 25–30 farms possessed dairy farms situated within their own separate and privately held 'outlying fields'.

Structural oppositions within the peasant community concerning the extension of the common lands

Under specific circumstances, the need may arise, among certain segments of the peasants, of acquiring some part of the common for individual, exclusive exploitation on a permanent basis, and safeguarding this piece of the former common lands against the others, as their separate and exclusively accessible resources. In principle, such an acquisition of common land parts may be undertaken in two ways:

(1) Through *a successive movement of appropriation* from farmsteads already bordering to the common lands. This would amount to a sort of 'direct' – or may be 'silent annexation', so to speak, and take the form of an extension of the individual farmland proper into the common ('direct appropriation'). Ordinarily, such directly appropriated areas did not become enclosed, but their boundaries were fixed according to terrain formations, marks in cliffs and stones, etc.
(2) The other way would be to *cultivate new farmland* in the commons, in the form of *new, separate settlements* or 'clearances' (in Norwegian: 'rydninger'). Such new, delimited clearances would not necessarily have common borders with any older agrarian entities or farmsteads, but might be surrounded on all sides by territory which still was considered as common land ('expansion by clearances').

The motivation for trying to appropriate parts of original commons as individually or jointly owned farmland seems to predominantly stem from the limitations and restraints which were laid down for ordinary resource exploitation in the commons, held up against the needs and aims of the individual peasant household, as viewed from its particular perspective. From the individual household's point of view, it might appear desirable to discard with the

regulations and restraints, and implement more thorough, intensive resource exploitation under individual control and without the restrictions laid down by the collective. Such a goal may of course be triggered by several circumstances: in a context dominated by agrarian-based, household economy, *increased population pressure* and *competition for the extensively exploitable resources* may of course lie behind. Specific external factors, like *increased market demand* for specific resources, which initiated innovations within the encompassing economic system, might have played a central role as well. That would appear to be the case of the increased international demand for *timber and wooden resources*, which promoted Norwegian export of these resources during the sixteenth and seventeenth centuries. As the forests stood out with a new value – both in the eyes of the rising bourgeoisie and the peasants – many of the latter sought to acquire the neighbouring forest areas of many commons as private forests – either as individual private property, or as so-called 'joint property' between two or three farms.

Such a drive for 'direct, silent annexation' appears to have been present in very different periods and in highly different contexts. Attempts of such appropriation might be undertaken from the oldest, well-established central farms in the communities, as well as from the ones in the middle stratum, and from the tiny clearances just recently established during Christian medieval times. Notwithstanding their ubiquity, such motivating forces in the direction of appropriation of course had to be mediated, balanced and checked out against other, counterbalancing and predisposing factors: *Distance* to the resource area originally considered as 'common', together with *ecological and topographic factors*, will of course play a part in determining the degree of *access* to these resources and the degree to which some of the occupants of neighbouring farms will strive to appropriate land or resist any newly established farm to hinder their passage and cut off the access to the commons. But such topographical factors will of course have to undergo a *social mediation*. The real decisive factor in determining how far the appropriation of 'common land' shall be allowed would appear to be the relative balance of social power between the peasant striving for appropriation and the collective of those peasants who would see themselves as 'cut off' from the commons by this very appropriation. The peasants, whose access to the commons was threatened by the expansion of private farmland, would naturally strive to halt back and check the movement of 'direct appropriation'. In other words, they would tend to put down a 'veto' against further direct expansion. This contradiction seems to be present at all times.

Thus, when it comes to the question of preserving the extension of the commons and the assortment of resources held within, there exists at all times an inherent contradiction within the community of peasants adhering to a common: between that minority of peasants who were residing on farms directly bordering to the common lands – and who therefore had the option of 'direct appropriation', given specific circumstances and incentives – and the majority of peasants who were residing on farms which did not offer direct access to the common lands, and who therefore would oppose the reduction of available common resources, due to such 'direct appropriation' by a minority. Such an opposition within peasant communities is reflected in countless court cases from Late Medieval times and the Early Modern period. In the appendix at the end of this article are rendered two examples highlighting how this contradiction might be expressed at various times, respectively, from a case in the valley of Gudbrandsdalen in 1432 and from a survey over the commons in Nannestad in 1759 (Appendix, *Diplomatarium Norvegicum*, vol. III, no. 717 and Testimonies about the commons of Holter, Nannestad and Bjørke parishes).

The medieval legislation concerning common lands

In most regions of Southern Norway, a conception of the areas that should be regarded as 'common lands', in contrast to territories defined as belonging to the separate farms, seems to have arisen at some point of time during the Iron Age or Early Medieval times. This development was probably called forth by the very structural opposition within the peasant community, as described above, and seems to have had two interconnected results: the establishment of a more definitive 'common boundary' and the explicit formulation of customary rules aimed at securing and preserving the physical extension of the commons as

well as prescribing what kind of resource exploitation should be allowed within these commonly held areas, as opposed to the 'outlying fields' and forests included in the separate farmlands.

The establishment of a 'common boundary' was probably due to the social pressure from those parts of the peasant community who, to an ever-increasing degree, saw themselves cut off from the access to the common resources, as the settlement expansion went on, and those peasants who were able, subjugated ever greater parts of the common resources and expanded their own farmland proper. Given that the group of peasants who experienced that their access to former common areas was denied or made difficult, was sufficient numerous or had the capabilities of rallying enough support, such a boundary may be established.[1]

The other result of this resistance and pressure from the collective of the settlement community, vis-a-vis the perspective of an ever-increasing 'direct appropriation' of common lands, seem to have been the formulation of a *customary rule* to the effect that the 'commons should be preserved for the future in the shape (extension) they had (at the moment), and according to customary practice.' Such a customary rule was in fact included and confirmed in the oldest regional law books that are preserved, and which were codified separately for each of the traditional law provinces. The origins of these regional law codes go back to the eleventh and twelfth centuries, and the preserved editions are dated to the latter half of the twelfth century and the first years of the thirteenth century, respectively. Alongside other regional law books, which only have been partially preserved,[2] they formed the state of law until a general nationwide law code was introduced by the royal legislation during the reign of Magnus the Lawmender in 1274.

Thus, Chapter 145 of *the Gulathing law book* – covering central parts of Western Norway – contains the following clause as introduction to its exposition of rules concerning the common lands:

> 'Every man shall enjoy water and wood in the common. His common shall every man have, in the way it has been …'[3]

And likewise, Chapter XIV, 7 of *the Frostathing law book* – which was valid in the Trøndelag region of mid-Norway – also started with this general clause:

> 'Thus shall the commons stay in the way they have been before, according to previous custom, both in the upper and exterior …'[4]

And then it goes on to stipulate the exact procedures for solving the very type of conflicts that may arise from alleged attempts of 'direct appropriation':

> '… But if men disagree, and one calls it for himself, and another calls it common land, then he have it endorsed who claims it for himself, and rally subsequently the local court assembly ('thing'), irrespective of it being a county court assembly or a half-county court assembly, which stands at disposal for men to settle such a matter, …'[5]

During the High Middle Ages, the King's authority in legal matters grew, and his capacity as legislator increased substantially, insofar as his role of initiator was accepted by the local thing assemblies of the peasants. New measures and regulations – which were always given the appearance of being 'amendments' or 'improvements' ('*rettarbøter*') of the old law – necessarily had to be presented for and accepted by the regional, representative court assemblies ('thing') of the peasants (*Frostathing*, *Gulathing*, *Eidsivathing* and *Borgarthing*).

During this process of legislation, the customary rule about preserving the commons in the shape they had always been, and according to old customs and practice, got confirmed and was incorporated in the (authorized) regional law books. But another clause was added, obviously on the initiative of the King. This clause concerned the land ownership status of potential settlers in the commons, who now were declared to be *tenants of the Crown*. Immediately after the clauses confirming the traditional status of the commons, the *Gulathing* law book states:

> '… But if settlement is made in the common, then it is owned by the King.'[6]

And the *Frostathing* law book (Chapt. XIV, 8) contains the following clause to the same effect:

> 'The King may rent out common land to whom he may wish.'[7]

In view of the earlier discussion, these points of legislation may now be regarded as a measure to ease and improve the situation for the potential settlers, vis-à-vis the customarily established 'veto' against infringements on the commons

(Solnørdal 1958, G. Sandvik 1978, p. 62–3). The Crown may have deemed it convenient and advisable that some land was placed at the disposal of such settlers, even though it meant an intrusion into the established rights of the communities when it came to exploitation of extensively used resources. As long as the old, customary rule about the preservation of the commons was preserved and fixed legal procedures were established for charges implying those kind of infringements, a clear-cut priority was established as to the kind of infringements on the commons that might be tolerated, viz. clearances and farm settlements consisting of separately cultivated areas with own grain production, which could contribute to the procurement of the ever-increasing population. 'Direct appropriation', which would imply the strengthening of the extensively exploitable resources for those already established, was still prohibited. This policy of favouring new settlement to a certain extent, promoted at the same time the number of individual farmsteads in the country, which subsequently could be subject to the *Crown's taxation*.[8] Becoming a tenant on Crown land also implied that the new tenant, in a certain sense, came under the protection of the Crown, and thus this measure might also have loosened and weakened older, more traditional power structures within the communities dating back to the times before the development of the central monarchy.

The taxation to the Crown had been institutionalized during the civil wars of the twelfth century – when the traditional obligation for the peasants to provide boats, equipment, men and food for the popular conscripted forces during wartime (the 'leidang') had been partly transformed to an annual tax in peacetime. Thus, the Crown's interest in tax objects cannot be much older than this arrangement, presumably dating from the middle of the twelfth century. On the other hand, the legislative position in these matters must have been clearly established in the southern parts of the country well before 1260. In this year, King Håkon Håkonsson referred explicitly to the state of law in southern Norway when he introduced similar regulations to the *Frostathing*'s jurisdiction area, as part of a law initiative for this region – his so-called 'New law':

> 'About those possessions (farms) which are called 'outside the staves' [= outside the border markers] and are established in the common, then we want such law and arrangement to stand between king and free men, as in the eastern or southern parts of the country, and they pay such obligation of the subjects here as there, according to the king's decree.'[9]

These regulations prescribed in the last versions of the *Frostathing*'s law, concerning the use of common lands as well as the procedures for settling disputes about the delimitation of them, was further repeated and elaborated in the National Law Code of Magnus the lawmender, promulgated in 1274 (Ngl II, pp. 144-145; Taranger 1979 [1915] pp. 155-157; Appendix, Section VII About land tenancy). Of particular interest is the regulation concerning disagreements or doubts about the boundaries between common lands and privately held farmland. First, the procedure prescribed in the *Frostathing*'s law is copied. Then, Chapter 61 of the National Law Code continues:

> ' 3. But if the king's commissioner [ombudsman] charges somebody for being the property possessor of such land that has been cleared in the commons without the king's permission, and the possessor answers like this: 'This land have I, and those who have owned it before me, possessed for 60 winters or longer', and if the king's commissioner raises doubt about this, then the property possessor shall produce his witnesses in the way that is stipulated above, concerning disputes about private property and common land.'

Concerning that part of the customary norms which enabled the peasants' communities to prevent new settlements in the form of clearances in the commons, the policy of the centralized monarchy must be said to have 'cut through' and established new legal conditions for potential settlers in the commons, provided they were accepted by the Crown's local representatives. But what has here been called 'direct expansion' and appropriation of pieces of common land by peasants on farms directly bordering to the commons was still prohibited throughout the Middle Ages and well into early modern times.

When did the common lands in southern Norway become institutionalised?

This presentation of the contending interests related to the use of the commons as well as the various

endeavours to acquire parts of them for separate farmland may also serve as basis for a methodological approach in trying to determine more precisely when certain areas in Southern Norway came to be constituted or institutionalized as common lands pertaining to the various peasant communities.

The last part of this article will deal with two cases from the central agrarian districts of Eastern Norway, where it seems possible to trace reminiscences of the two kinds of common land appropriation through an analysis of the available sources. The main focus will lie with the possibility of relating the successive appropriation of former commonly held areas to the main stages in settlement development, trying to highlight the relative order of succession in which the particular farms were established and whether their farmland possibly underwent some expansion as time went by. The primary sources for determining the presumable age of farms consist of *archaeological evidence* and toponymic analysis of the *farm names*. But this material must be combined with an analysis of boundary patterns, relating to both the later documented boundary of the commons and to the boundaries between separate farms, in order to disclose whether some of the farms might have been established as offspring from earlier settlement cores which had undergone a partitioning. In this connection, a retrospective analysis of the land ownership relations pertaining to the separate farms – as well as their relative size – is also highly relevant. In a similar retrospective manner, some information may also be deducted from later legal disputes concerning the extension of private farmlands as opposed to common land areas.

The two selected areas of investigation are Nannestad and Ullensaker, which are situated in one of the most central agricultural regions in the eastern part of Southern Norway, called *Romerike* (Figure 1). In fact, the inhabitants of this region, *the Raumaricii*, are mentioned in as early as Jordanes' work *Getica* (Mierow 1915). For Norwegian standards, this region offers some of the most favourable conditions for cereal production, while at the same time they dispose of woodland and outlying field areas suitable for cattle pastures and the exploitation of other, supplementary resources. The development of settlement and agrarian practices in this region – including processes related to the common lands – has been studied for many years by several scholars, such as *Andreas Holmsen, Birger Kirkeby* and more recently by *Dagfinn Skre*, who, in particular, has focused on the transformation of social structures and local authority in a time span ranging from the older Iron Age through the Middle Ages (A. D. 200–1350)(Holmsen 1966; B. Kirkeby 1962, 1964, Kirkeby 1966, D. Skre 1998).

From early modern times there exists a comprehensive source material highlighting legal conflicts and administrative procedures relating to the use of the common lands as well as disputes about the delimitation between the common land areas and the separately held farmlands. The region is also well covered by medieval and early modern land cadasters, which give ample options for reconstructing older property relations and thus describe 'the geography of land ownership' from a historical perspective.

In recent times, Nannestad and Ullensaker make out two separate municipalities, having about the same limits as the parishes bearing the same names and which were established by the church during the Middle Ages. But an interesting fact is that the oldest written sources also document an *older, pre-Christian territorial organization*, which *did not* coincide with this medieval parish organization. Several medieval charters refer to these pre-Christian communities, displaying quite other names than the later parishes (Steinnes 1932, pp. 80-82; Bull 1922, p. 51ff., 1927, Kirkeby 1962, 1964, 1966, Holmsen 1966, p. 37).

In fact, the commons of Romerike appear to have been structured systematically according to this *pre-Christian territorial organization*. This gives a distinct time depth to the institutionalization of the common lands and a *terminus ante quem* for their organization. An overview over the correspondence between the pre-Christian communities and the parts of the later established parishes which they covered is given below.

From a topographical perspective, the common land areas of Romerike are generally situated above the 200-

Pre-Christian communities	Medieval parish annexes		Modern municipality
Vesong (to the West)	Ullensaker	}	Ullensaker
Kisa (to the East)	Ullensaker		
Jasseimr (to the South)	Hovin		

Pre-Christian communities	Medieval parish annexes		Modern municipality
Vestþorp	Nannestad (Bjørke)	}	Nannestad
North Læm	Holter		
South Læm	Heni		Gjerdrum

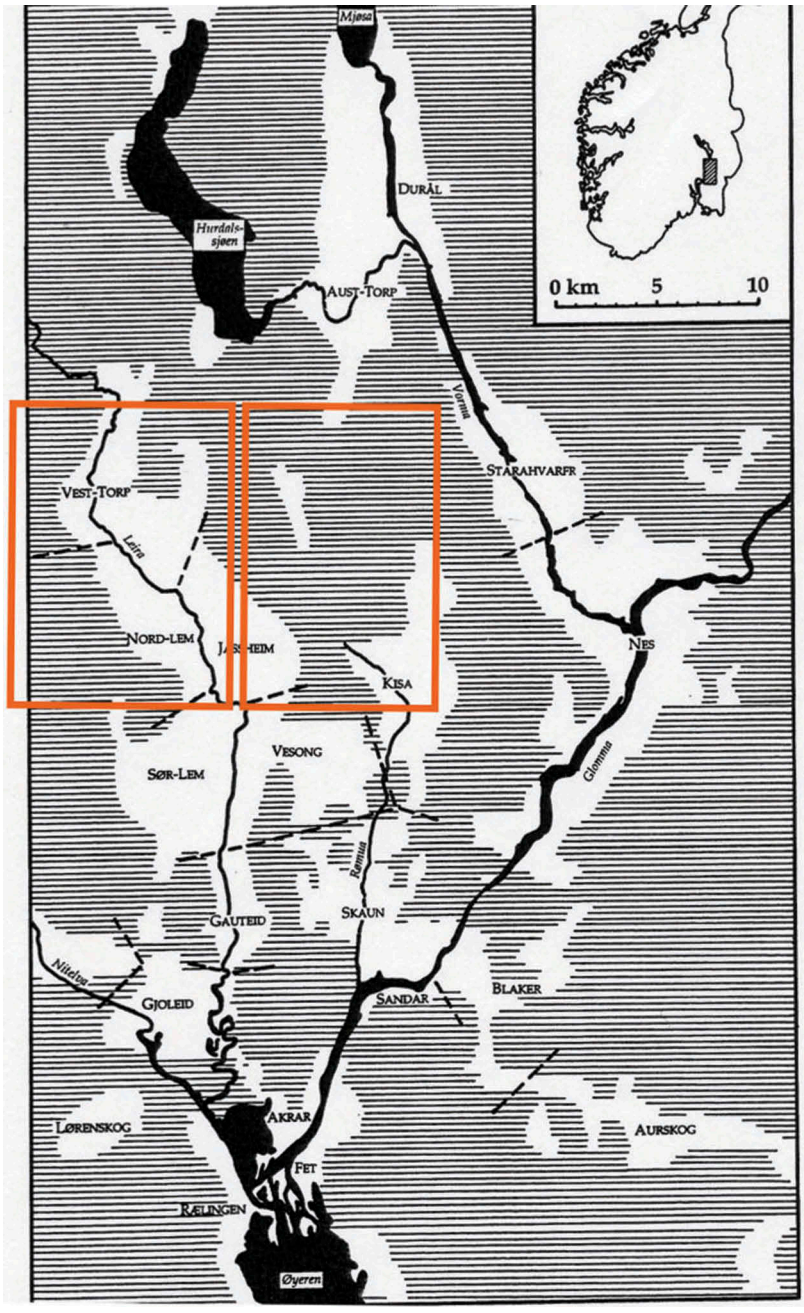

Figure 1. The region of Romerike, with the location of the municipalities Nannestad and Ullensaker (map basis reproduced from D. Skre, Herredømmet: Bosetning og besittelse på Romerike 1998).

m contour line, which makes out the marine limit in this region (Sømme 1954, p. 91; Holtedahl 1970, pp. 171 – 175, 192; Gjessing 1978, p. 94.). In the municipality of Ullensaker, the common consists of forests, hills and outlying fields bordering to three of the pre-Christian communities: the community of *Kisa*, stretching from the east and westwards into the commonly accessible area, the community of *Jasseimr*, situated in the south and southwest of the common, and the community of Vesong, bordering to the northwestern parts of the common (Figure 2.).

In the municipality of Nannestad, the common is, in its entirety, situated west of the core settlement, in the ridgy area called *Romeriksåsene*, stretching westwards from the wide valley formed by the river *Leira*. This hilly region makes out the border area toward the neighbouring river valley to the west, with the settlements of *Hakadal* and *Nittedal* (Figure 3.).

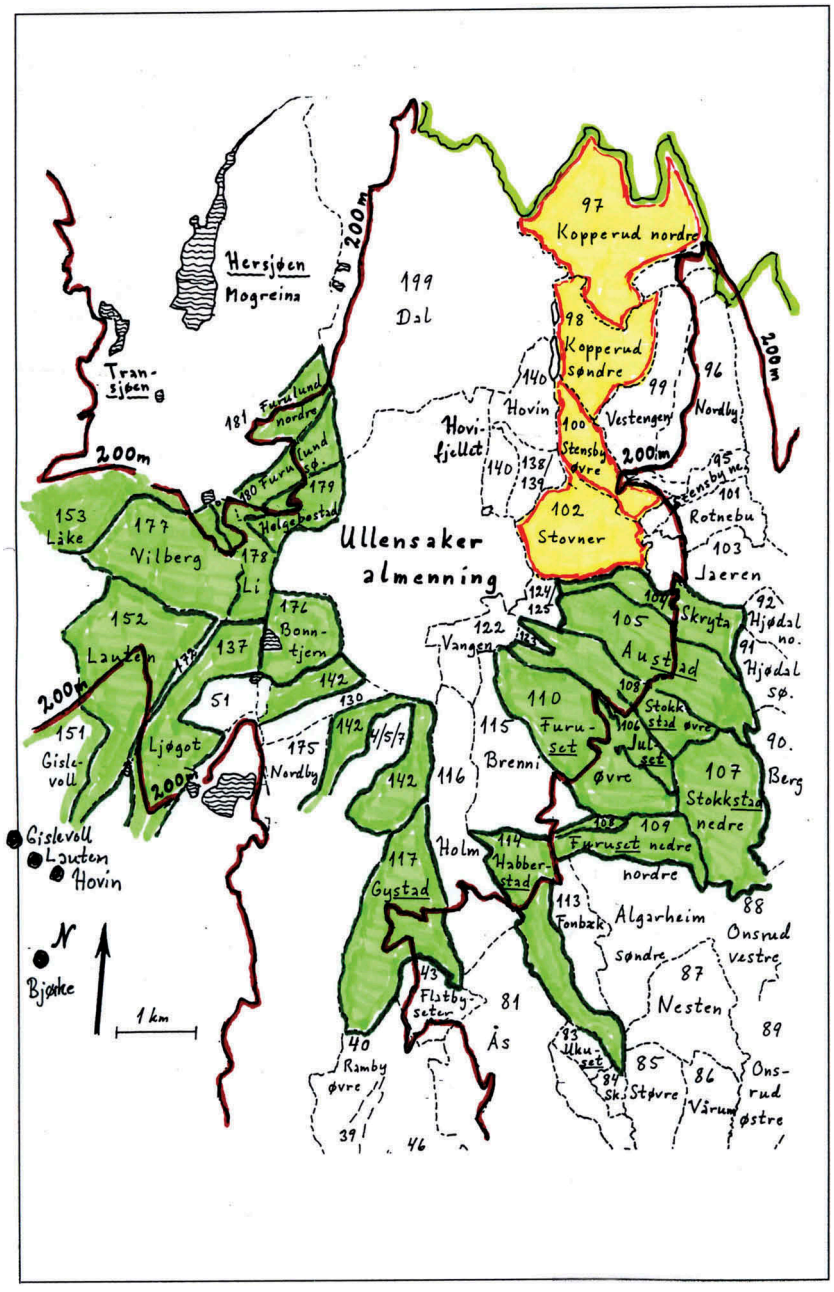

Figure 2. The common land of Ullensaker with surrounding farms. Areas possibly subject to 'direct appropriation' of previous common land marked with green colour; areas with separate clearings in previous common land marked with yellow colour.

The common land area of Nannestad was even more strictly organized according to the old circuits of the pre-Christian settlement communities, also during Medieval and early modern times. That is, the different parts of the outlying areas situated in the hillside west of the settlement along the Leira river were commonly accessible only from those farms which originally had belonged to one of the particular pre-Christian communities. In this way, the northernmost part of the common was used by peasants on farms which had belonged to '*Vestþorp*' in pre-Christian times and later became identified as *Bjørke* parish; the middle section was used from farms adhering to the pre-Christian community '*North Læm*' (corresponding to the later parish annex *Holter*), while the southernmost parts were

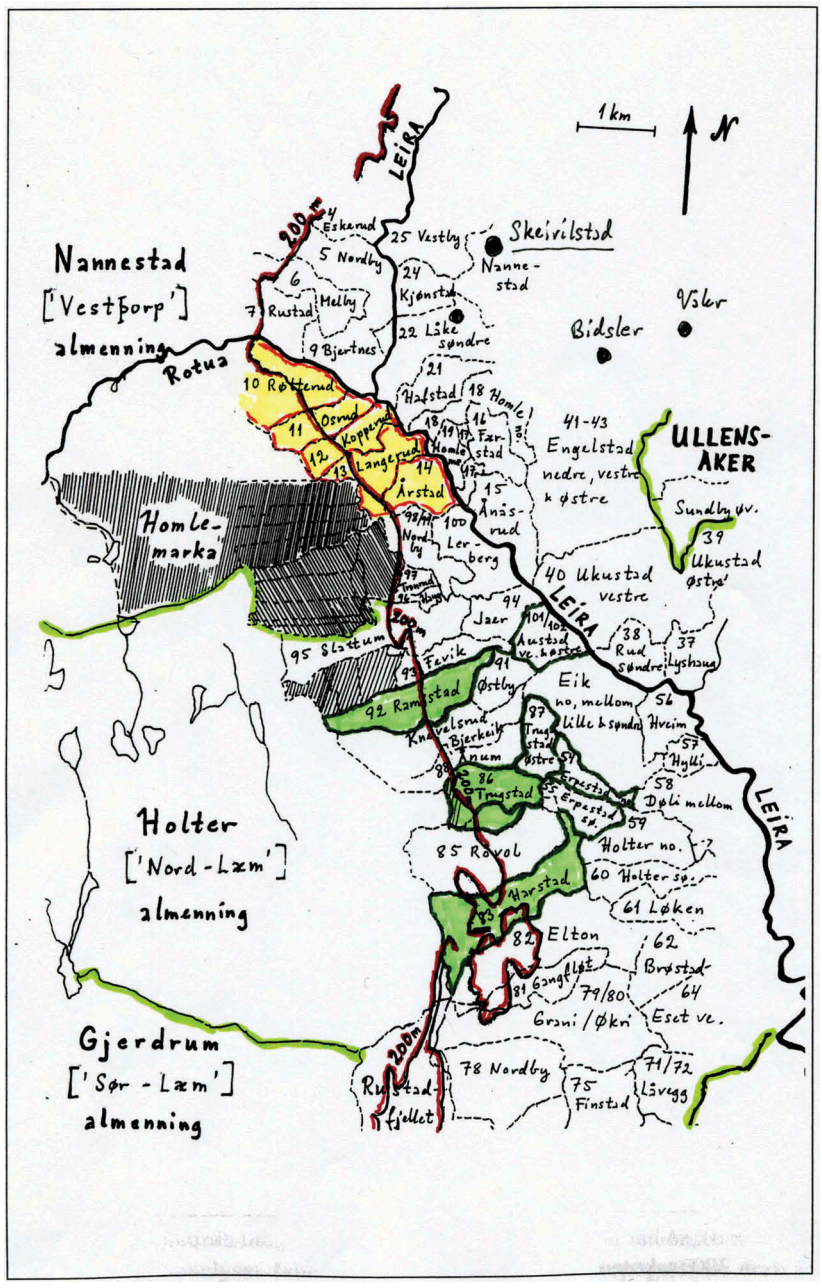

Figure 3. The common land of Nannestad with surrounding farms. Areas possibly subject to 'direct appropriation' of previous common land marked with green colour; areas with separate clearings in previous common land marked with yellow colour.

used by occupants on farms originally belonging to '*South Læm*', which later became the parish of *Heni* within the *Gjerdrum* municipality.

The common of Ullensaker:

- Expansion from the southwestern side, from the parts of the pre-Christian community 'Jasseimr':

A sort of 'direct appropriation' – in the form of expansion into districts bordering to the common land as it was later defined – seems to have taken place with point of departure in some great, central farms, like *Låke, Lauten, Ljøgot* and *Bjørke*. These farms were presumably of high age and were assessed for great amounts of rent ('landskyld') during the High Medieval times. According to early

modern cadastres, they were, on average, assessed for three skippounds of grain, ranging from 1.25 to 4 skippounds (Skattematrikkelen 1647, II; Imsen & Winge 1999, p. 381). Together with the exceptionally great farm complex of *Hovin* (with four farm units together assessed for 12 skippounds, the probably represented great manor complexes in early historical times (D. Skre).

- Expansion from the southeastern and eastern sides, from the southern parts of the pre-Christian community 'Kisa':

Here, a sort of 'direct appropriation' is also traceable, but, in this case, related to expansion from a set of farms which were *not* among the presumably oldest and more central. The expansion seems to have been undertaken from a set of farms which were secondary to the oldest and most central ones, probably representing later separated offspring from them. A general indication is that nearly all of them have composite names, compound with the elements *-set* or *-staðir*, which generally are thought to designate later settlement units, split off from an earlier settlement core. That this group of farms represented younger and more peripheral settlements than the core of manors in southwest seems corroborated by their rent assessments, as they are recorded in the later cadastres. On average, they were assessed for 1.33 skippounds of grain, ranging from 0.6 to 2.5 skippounds. The few farms which do not display such name elements bear names which might reflect particular activities in outlying fields, like for instance *Brenni* ('burning', 'slash-and-burn field'), *Holm* (possibly 'patch of grassland', 'uncut meadow') and *Vangen* ('grassland', possibly referring to a dairy farm site) (Rygh 1898, (1966), pp. 45, 56 & 84).

- Expansion from the northeastern side, from the northern parts of 'Kisa':

Some examples of 'new clearings' or individually established settlements in former commonly held areas, seem detectable. This goes for the farms *Kopperud, Vestengen, Stensby, Rotnebu* and *Stovner*. The compound element *-rud*, as in Kopperud, literally means 'clearing' (Norwegian: 'rydning', cf. German: 'Rodung') and is generally considered to have been productive in early medieval times. Several of the other names also seem to indicate places taken up as habitation units in a later phase, like the elements '-bu' ('booth', 'shed') and '-by' ('farm', 'dwelling place'). The original name of the farm Vestengen was '*Hedeby*', where the compound element '-by' had been combined with *heiðr*, meaning 'unsettled, treeless and plain area' (ibid., pp. 46, 47 & 53.). The rent assessment of this group of farms seems to indicate that they had been established as separate, settled farm units at an even later point of time than the 'secondary stratum' further south. On average, these presumed clearings in the northeast were registered with an average rent of half a skippound grain in early modern cadastres, ranging from one quarter to three quarters of a skippound.

The commons of Nannestad

- The middle section, related to the parish of *Holter*, and the corresponding pre-Christian settlement community of '*North Læm*':

In this area, one can observe a number of farms displaying the name element *-staðir*, which by their establishment had acquired a favourable position for possible direct expansion into the common areas. This goes for the farm *Harstad*, a part of *Trugstad*, and for *Ramstad*. Together with the other *-staðir*-farms, like *Erpestad* and *Austad*, these clearly make out a set of settlement units that was secondary to the most central farms, situated along the riverside and partly east of Leira. However, judging from the rent assessment, these *-staðir*-farms in Holter parish must have disposed richer resources than their counterparts in Ullensaker, since they, on average, were estimated for a rent of ca. 2 skippounds, ranging from 1,25 to 3 skippounds. Nevertheless, some of them occupied a position that presumably had enabled them to expand somewhat into the outlying field area situated above the marine border. But such an expansion had obviously also taken place from similarly situated farms with name elements that might relate to activities in outlying areas. Among others, this concerns the farms *Knevelsrud* (with the compound *-rud* meaning 'clearing'), *Fevik* ('cattle cove') and *Slattum* (literally meaning 'hayfield home'). The average rent of these farms was 1,2 skippounds.

In part, the pattern observed in the middle section of Nannestad may thus be a result of processes analogous to those unfolded on the southeastern side of Ullensaker common, from the farms belonging to the southern part of Kisa.

- The northern section, related to the parishes *Nannestad* and *Bjørke*, and the corresponding pre-Christian settlement community of '*Vestþorp*':

In this district, we find the highest concentration of farms with names composed with the element *-rud*, indicating that they were rather late clearings, like *Langerud, Kopperud, Osrud* and *Røtterud*. And in a majority of them, the first component consists of pre-Christian forenames, suggesting that they probably were established before the Christianization process in the early middle ages. However, these farms should most probably not be considered as clearings taken up within the common land area, but rather seem to have been established within an outlying field area pertaining to and exploited by the great central farm *Homle*, situated to the east of the Leira river. To the west and south of these *-rud*-clearings stretches a wide 'joint property' area, which has the name 'Homlemarka', meaning 'the outlying fields of Homle', and which probably was established as an influence sphere dominated by Homle at an early date. Several of the clearings do also possess parts in this joint property area. Furthermore, a court suit from 1686 indicates that the boundaries between this joint property area and the common were disputed already in the beginning of the fourteenth century, as it is referred to in a royal letter from about 1332 (Kirkeby 1962, p. 50). In other words, the boundary patterns and the joint property relations seem to indicate that there has been no direct annexation of common land areas on part of these clearings, but that the appropriation of the outlying areas where the clearings were established had been undertaken from Homle at an earlier date. In other words, the boundary between what were considered as the separate outlying fields of the central farms and what was considered as common land seems to have been constituted before the establishment of these separate clearings.

Conclusion

Returning to the central question, concerning a more precise fixation of the time when a boundary was constituted between the common lands and the separate farm properties, the evidence presented above seems to indicate both an earliest possible starting point (*terminus post quem*) and a latest point of completion (*terminus ante quem*) for this process. Judging from the boundary patterns observed in both parishes, the delimitation between the outlying fields pertaining to the separate farms and the area considered as common land seems to have been constituted *after* the establishment of farms with the compound elements *-set* and *staðir*. This would have been the case both in the middle section of Nannestad, corresponding to Holter annex parish or the pre-Christian community of 'North Læm', and in the southeastern part of Ullensaker common, with farms belonging to the southern part of the pre-Christian community Kisa.

While the name elements *-set* and *-staðir* traditionally were regarded as having come into use and been particularly productive during the Viking Age and first part of the Middle Ages, a series of archaeological investigations from later years have proven that they might be considerably older, and at the same time productive over a long time span. Based upon an investigation of the archaeological evidence, *Lars Stenvik* concluded that

> . . . a relatively great part of the "staðir"-farms must be traced back to the older Iron age. It seems that the name element "-staðir"/"-staðr" has gained foothold in this country at the end of the Roman Iron Age, and has won particular popularity during the Migration Period.[10]

For the area under investigation, this picture has been confirmed by Dagfinn Skre's comprehensive investigation of settlement and regional structures of authority in Romerike during the period A.D. 200–1350. While many of the farms bearing compound names with *-set* and *-staðir* display remains related to the younger Iron Age and Viking Period, a substantial proportion of them also show archaeological evidence, which indicates settlement, activity and resource exploitation during older periods, stretching back to the younger Roman Iron Age and Migration Period (single burials, grave fields,

cooking pits and even house structures) (Skre 1998, pp. 128–184.). When using the time of establishment of the *-set* and *-staðir* farms in order to determine the *terminus post quem* for the institutionalization of the common land boundaries, we should therefore realize that the archaeological evidence places this earliest possible starting point for the process back in the Roman Iron Age, or from the period A.D. 200 to 370 given in calendar years.

Relating to the farms with names composed with the elements *-rud*, the situation appears more complex. On the Kisa side of Ullensaker parish, there is a rather clear-cut demarcation among the farms bordering to the common. Farms bearing names ending with the elements 'set' and 'staðir' are dominating in the south, while the farms further north seem to represent later established settlement units and possibly clearings in areas which previously were regarded as common land. As such, this north–south demarcation between farms representing different phases in the settlement development may reflect an older boundary to a commonly area in the north.

In Nannestad municipality as well, there are several *-rud*-farms in the northern part, within the area belonging to Nannestad main parish and Bjørke annex parish. But these seem to have been established as separate farmsteads within an area previously held to be separate outlying fields of an older, central farm further to east. Thus, the boundary between these separately held outlying fields and the common exploitable area would seem to have been established at an earlier point of time, before the *-rud*-clearings were taken up.

In this way, the time of establishment of the *-rud*-farms seems to indicate a *terminus ante quem* for the constitution of the common boundary. The fact that a majority of these farms were constructed with pre-Christian forenames might serve as an indication that this process of delimitation would have been completed before Christianity gained a strong foothold in these inner parts of Eastern Norway, something which is commonly thought to have happened at the middle of the eleventh century. However, as the use of pre-Christian forenames continued for a long time after the Christianization period, as well as through the following centuries, this indication would seem rather weak. But the fact that the commons of Romerike were structured systematically according to the *old, pre-Christian territorial organization*, stands for itself. On the basis of this analysis, the fixation of the mid-eleventh century as a *terminus ante quem* for the constitution of the commons in central parts of Eastern Norway, therefore, stands out as a fairly well substantiated conclusion.

Based upon an analysis of the probable settlement development and the resulting boundary patterns combined with the archaeological evidence and toponymical material, this investigation therefore indicates that the boundaries between common accessible areas and farmland proper must have established sometime between the later part of the Roman Iron Age and the first part of the Middle Ages, as defined in Scandinavia. However, this does not necessarily imply that the process of delimiting the common lands must be considered as a continued, uniform and protracted process stretching over a time span of about 900 years. Within these time limits, the concrete appropriation of different parts of the outlying field land into areas considered as individual farmland may have taken place at different times in various parts, displaying great variation, according to specific conditions of settlement expansion and possession, resulting in a differentiated demand for appropriation.

Notes

1. In the southern Norwegian provinces of Telemark and Agder, this kind of social pressure or support does not appear to have been sufficiently effective to bring about any constitution of a 'common boundary'. In these regions, the semi-mountainous areas and 'outlying fields' in their totality were divided between the separate farms. This phenomenon may have been caused by the principal parity between the farms and peasants, which may go back to the earliest phases of the settlement. Almost all the land in these regions was owned by the peasants, reciprocally.
2. Unfortunately, those parts of the Eastern Norwegian regional law books that deal with secular matters of land management have not been preserved.
3. '*Hverr maðr scal neyta vatz oc viðar i almenningi. Sinn almenning scal hverr hava, sem at fyrnsku hever haft. . .*' (Ngl I, p. 58; Robberstad 1969, p. 156; Eithun, Rindal & Ulset 1994, pp. 106–107).
4. '*Svá sculu almenningar vera sem verit hafa fyrr at fornu fari bæði hit øfra oc hit ytra. . .*' (Ftl. XIV, 7; NgL I, p. 250; Hagland & Sandnes 1994, p. 204).

5. '…*En ef menn scill á, callar annar ser an annar callar almenning, þá festi sá lög fyrir er ser callar, oc kenni þing siðan, hvárt sem þar er fylkisþing eða hálfuþing er menn eigu því máli at scipta*…' (Ftl. XIV, 7; NgL I, pp. 250-251; Hagland & Sandnes 1994, pp. 204–205).
6. '… *En ef bygð gerizt i almenningi, þá á konongr*' (Gtl. 145).
7. '*Konungr má byggia almenning hvargi er hann vill*' (Ftl. XIV, 8).
8. As these measures were being implemented for *Frostathing*'s law in as late as 1260, some scholars have further suggested that they represent a countermeasure to certain difficulties signalling the beginning of agrarian crises already in the High Middle Ages: Slightly worsening climatic conditions shall allegedly have aggravated the situation for agriculture in the northern part of Norway already during the thirteenth century (see Holmsen 1975, pp. 481–490).
9. '*Of eignir þær er utan stafs ero kallaðer oc i almenningen ero görvar, þá vilium ver at þar standi slíc lög oc scipan um meðal konungs oc karls sem austr eða suðr í landit, oc slíca þegnscylldu geri þeir her sem þar eptir konungs skipan.*' (NgL II, pp. 144-145; Frostatingslova 1994, p. 9).
10. L. Stenvik, 1978. *Stadgårder: Et forsøk på arkeologisk datering av en navneklasse*. Bergen: Major thesis in archaeology, University of Bergen, p. 158; – author's translation.

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Appendix

- ***Excerpts from The National law code for Norway*, established by *king Magnus the Lawmender, 1274*:**
  Section VII, about Land tenancy

Chapter 61: 'If people dispute about common land'

"**1**. Thus shall the commons stay in the way they have been from olden times, both in the upper and exterior. **2**. But if people disagree, and one calls it his own, what another one calls common land, then the one who calls it for himself, shall take it to court and summon 'thing' to that place, where the matter shall be settled, and he must issue the summons within five days; but if he does not do it this way, then his action is not valid for this time. But at the 'thing' shall 12 haulds (= allodial peasants ?) – or 12 of the best peasants, if there are no haulds – 6 appointed by each part from that court circuit, and two of the twelve shall bring testimony, swear an oath as to whether it is peasant property or common land. But on the 'thing' shall the one who calls the land his property, within 5 days' notice summon a court meeting at the place in question, and there produce those witnesses that were appointed at the 'thing' assembly. . . .

3. But if the king's commissioner charges somebody for being the property possessor of such land that has been cleared in the commons without the king's permission, and the possessor answers like this: 'This land have I, and those who have owned it before me, possessed for 60 winters or longer', and if the king's commissioner raises doubt about this, then the property possessor shall produce his witnesses in the way that is stipulated above, concerning disputes about private property and common land.

Chapter 62: 'How one shall have one's use of the common lands'

1. The King may lease out common land to whom he may wish. But the one who leases, shall fence it in – with the throws of a sickle in all directions from the settlement [that is: defining the extension of the land pertaining to the new clearing by the distance which he is able to throw a sickle], and later he is not allowed to move the fences. **2**. The right to hayfields shall be disposed for 12 months by the one who first uses the scythe in them. **3**. Dairy farms may everyone who wishes, establish in the commons, and stay there in summer. **4**. But if someone takes up sowing [of grain] in the commons, and have not leased [the land] from the king's commissioner, then the king owns both grain and hay, if hay has been cut. . . .

7. Everybody is equally entitled to all fishing lakes in the commons. **8**. Timber and boards [which has been cut] may, if necessary, be stored for as long as 12 months in common land. But of everything else, only so much may be cut, as can be freighted away before evening; in other respects, everybody is equally entitled. But if any wood that according to previous stipulations is allowed to be stored, is taken before 12 months have lapsed, then the one who took it, is obliged to pay 6 'øre' in silver to the king, but the owner shall have compensated the value and enmity fine according to legal verdict."

(English translation by Lars Ivar Hansen.)

- **Testimonies about the commons of Holter, Nannestad and Bjørke parishes, recorded June 6th, 1759. (Appendix to missive from province governor Storm in Akershus province, May 9th, 1761; Archive of Generalforstamtet, Norwegian National Archives.)**

'. . .The occupants of the farms laying farthest away in Holter parish (in Nannestad) did most humbly plead that those among the peasants on farms bordering closely to the common, who were not able to produce any legal title to their enclosures of the so called home-forests, must either be ordered to tear down the same enclosures, or else must the other ones also be allowed to have the same freedom to fence in that land which is situated most suitably to them; if not, they would have no use of the common.'

(English translation by Lars Ivar Hansen.)

- **Letter issued at the farm Bjölstad in Vågå parish, Gudbrandsdalen valley, 23.09.1432. Published in Diplomatarium Norvegicum, vol. III, no. 717.**

To all men, those who may see or hear this letter, do we **Ogmund Nikulasson, Tore Hugleiksson** and **Jon Pálsson**, county court jurors in (the parish of) *Vågå*, send the greetings of God and ourselves, announcing that we and several other good men were present at the farm **Bjölstad**, which lies in the valley of Gudbrandsdalen, on the tuesday following the Imbre [= Emmeran ?] sunday of autumn, in the 44th year of the reign of our dignified lord, Hr. Erik, by the grace of God king of Norway.

There we listened to **Andres Jonsson**, who on behalf of the peasants of Vågå brought charges before the King's representative in the northern half of Gudbrandsdalen, that they (the peasants) mistrusted **Eirik Björnsson**, who claimed to have 'home-area' [= individual farmland proper] stretching into the King's common, for a longer distance than he rightfully ought to. – Thereafter we stretched 'home-area-rope' from the ring of his store house, north of the pool called Sindrehölen which lies in Midlunne, and we put marking sticks at the place where 'home-area-rope' ended; with

the consent of all us being present, and in the presence of the King's representative. – Then spoke **Andres Jonsson**: 'Now we know your home-area, and if anyone does you harm within this mentioned home-area, and in your fishing, it seems to me as though he has taken it from your store house.'

For the sake of truth did **Pál Halvarsson**, the above mentioned representative of the King and present, put his seal – and we our seals – under this document, which was issued at the day and in the year previously stated.

(English translation by Lars Ivar Hansen.)

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RESEARCH ARTICLE

The Norwegian bureaucratic aristocracy and their manor houses in the thirteenth and fourteenth centuries

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ABSTRACT

Except royal castles in major Norwegian towns, only two stone castles were built by Norwegian aristocrats in the High Middle Ages. All other aristocrats lived in wooden buildings. Of these only Lagmannsstova at Aga in Hardanger remains. It has been attributed to the appeal court judge Sigurd Brynjulffson, though to have been constructed at the end of the thirteenth century as one unique building. However, investigations show that the remaining hall made up less than one-third of a building complex containing two halls, a chapel, kitchen and living quarters, all built at the first half of the thirteenth century. Investigations also show that the powers of the appeal court judge were drastically expanded at the same time, not at least by the Norwegian Code of the realm of 1274. By relating judicial powers and manor house, we get a quite different image of the Norwegian aristocracy and bureaucracy in the High Middle Ages than the popular one of an egalitarian peasant society.

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The Norwegian poet Bjørnstjerne Bjørnson, author of Norway's national anthem, published a poem in 1890 where he makes the claim: '*Norge, Norge, hytter og hus og ingen borge*' ('Norway, Norway, cottages and houses and no castles') (Bjørnson 1890, p. 232–233). In this poem, Bjørnson expressed a view of Norway which had played a vital role in the making of a Norwegian identity since the second half of the eighteenth century. A major source of this identity was the ancient Norwegian laws, as they were found in the Gulating and Frostating Compilations.

Gulating and Frostating were two popular assemblies for the western and middle parts of Norway respectively – the areas north and south of the later towns of Bergen and Trondheim. For instance, Christian Magnus Falsen, lawyer, historian and prominent member of the constitutional assembly making the Norwegian constitution of 1814, viewed these popular assemblies as the body where all free men themselves produced the norms regulating everyday life.[1] Or in other words – in Falsen's eyes, Gulating and Frostating were the Norwegians' Agora and Forum Romanum.

For Falsen, and later nineteenth century historians like P.A. Munch, a free man in the Norwegian Middle Ages was a man with *odel* (allodium) to the land (Munch 1856, especially pp. 239–242), which means a family priority concerning succession. Hence *odel* was the Norwegian equivalent to nobility, but much more widely distributed and not the right of a closed social class, since *odel* could be obtained by personal effort and not only by grant. In such a society, there would logically be only cottages and houses and no castles, as Bjørnson put it in 1890.

This image of Norway had a number of different political consequences. One was the prohibition by law of a Norwegian nobility in 1821, taking away what was viewed as a social irritation in Norwegian society, thought to be imported from Denmark. Another consequence would be a long-lasting neglect of the manor houses of the Norwegian aristocracy of the thirteenth and fourteenth centuries. Because despite the fact that we have written sources proving the existence of large wooden houses built on stone cellars, like Kvåle by the Sognefjord, and physical evidence, like Sponheim by the Hardangerfjord, these sites have not been excavated (Ekroll, p. 198–201). Hence, we lack knowledge on how the aristocracy in the thirteenth and fourteenth centuries made visible their power

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in the Norwegian landscape. But this is not all. We also lack a source when interpreting the written sources of these centuries. Because with no physical traces of an aristocracy, their importance in the sources has also been overlooked by many. Had Falsen or Bjørnson actually seen manor houses from the thirteenth and fourteenth centuries, it would have been more difficult for them to hail Norway as a nation of political and social equality.

Aga by the Hardangerfjord is a site that provides strong evidence of how the manor houses of the Norwegian aristocracy in the thirteenth and fourteenth centuries might have looked. Here Lagmannsstova still provides evidence of the complex of houses that stood here during the life of the appeal court judge, knight and member of the king's council, Sigurd Brynjulfsson, from approx. 1240 to 1303. And with an important part of the original building complex still preserved, with written sources on the parts demolished, and with the preliminary research done by government scholarship awardee Guttorm Rogdaberg, Aga is the best source of knowledge on this partly lost aspect of Norwegian history. By reading the Norwegian Code of the Realm of 1274, replacing the Gulating and Frostating Compilations, in light of Aga and its appearance in the High Middle Ages, we will discover that the aristocracy had much the same prominent role in the administration of the realm as their manor houses had in the visual landscape.

Aga by the Hardangerfjord

The short, descriptive name Aga indicates that the place has been inhabited for several thousand years. It is situated in the fjord landscape in the western part of Norway. More precisely, it is on the Sørfjord, an arm of the Hardangerfjord, south of Bergen. In the short distance between the fjord and the mountains, we find steep fields being farmed. The reflection of the sunlight from the fjord, the stored heat in the hillsides warming the fields at night, and the abundance of rain and natural drainage makes this area rather fertile, despite the small amount of agricultural land. Still, agriculture was not the reason for the – by Norwegian standards – large concentration of gentry in this region. Rather this is due to the fact that the Hardangerfjord is situated on the edge of the Hardanger plain, the geographical divide between the western and eastern parts of Norway. This vast plain served as the main travel route for trade between east and west. Hardanger was thus a transfer station for goods from the interior of eastern Norway on their way to the west coast and the North Sea Basin.

At Aga today we find a cluster of a total of 50 houses, about half the number of the houses you would have found there a hundred years ago. Small hamlets like this, in different sizes, were common in the Norwegian fjords up until the twentieth century. As with Aga, these hamlets originated from a single homestead that was divided between the heirs into more and more farming units. Aga was probably split into two parts on Sigurd Brynjulfsson's death in 1303, and by 1938, it was split into nine parts and had thus turned into a hamlet rather than family farm land.

Even though the farm land was divided, the houses were not necessarily so. In the Norwegian Code of the Realm of 1274, it is explicitly stated (VII-15) that if more than one man lives in a house, they all have the same right to use the entrance, and a second entrance should not be made. This tradition was the good fortune of the appeal court judge's hall, since instead of demolishing the house as the farm land was divided, more and more families shared the house, and in the end five families had a share in it. The last inhabitants did not move into a modern house until 1942.

The name Lagmannsstova, or 'the appeal court judge's hall', is a rather recent name not dating back further than the preservation by law of the house and surrounding hamlet in 1926. Originally the house was called Storstova, meaning 'the large house', or Torgillsstova, meaning 'the house of Torgill'. It was built at some point during the second half of the thirteenth century using logs, the same way most houses were built in Norway until the 1930s. What is different with Lagmannsstova at Aga is the size of the house, the size of the logs it is built with, and that it has a stone cellar, see Figure 1.

The hall itself was about 8 × 7 m, in total a little short of 60 square metres. It was joined on the northern edge by Mosstova, which served as the kitchen. On the southern side, we first find a church and then Fruekammeret, 'the ladies' chamber'. Altogether the house was about 27 m long.

Figure 1. The Manor house (Lagmannsstova) at Aga made as a 3D-rendition, based on the mentioned written evidence (graphics by Arkikon).

Lagmannsstova was built of logs that at the bottom are close to 80 cm thick, while the thickness of the logs at the top is about 30 cm. The edges of the logs are decorated with profiles. The doors are decorated with wooden lilies and ornamental door mountings, and the roof beams were also decorated. Lilies featured in the coat of arms of Sigurd Brynjulfsson and also appear on the tables that are still in the hall.

Lagmannsstova stands on a three-room stone cellar. The size of both the building itself and the logs it was built with are unusual. But a stone cellar is by far the most unusual feature of the building, and this more than anything indicates that it was the home of an aristocrat. Except for royal castles and churches, wood was the preferred building material, with the exception of the stone cellars of the aristocrats and higher clergy.

A document written at Aga in 1293 mentions the appeal court judge Sigurd Brynjulfsson, with the sheriff and knight Peter to Sponheim, the aristocrat Torolv to Jåstad, and Jon the vicar (*Diplomatarium Norvegicum* 1858 no. 6). Jon might have been Sigurd Brynjulfsson's own vicar, serving in the chapel next to the hall. This part of the building was described in 1680 as still in good condition, made with an artistic hand and great skill.[2] It was 7 × 5 m, with a ceiling height of 5 m (Rogdaberg 2010). The church was taken down in 1811 and replaced with a room for one of the families who had shares in the building after division of the farm land (unpublished diaries of Johannes. P. Aga (1767–1838) and Johannes. J. Aga (1814–98), in family possession).

Another part of the building that was taken down in 1811 was Fruekammeret. This part also served as home to one of the families, and stood above the last of the three rooms in the stone cellar. Indeed, it was probably the cellar that made the inhabitants decide to dismantle the room and reuse the logs in a new house. The potato had been introduced in Hardanger during the last decades of the eighteenth century and had to be stored in frost-free cellars below, not above the ground. This part of the stone cellar was therefore demolished, and the old Fruekammeret was rebuilt on ground level, almost attached to the old building.

The last part of Lagmannsstova to be demolished was Mosstova in 1894. The old kitchen was replaced with a modern house, built flush with the old building. The medieval well of Mosstova is still in the basement of the new house.

Hence Lagmannsstova, in its current form, is just above half of its original size and appears more like a building than a complex of buildings, as it originally was. Moreover, there was a similarly sized and shaped building parallel to Lagmannsstova in the east from the thirteenth century until 1811. When this eastern part of the building complex was demolished in 1811, it was probably because the six families inhabiting it wanted to use their share of the logs to build their own houses with satisfactory storage for potatoes.

Like Lagmannsstova, the parallel building also stood on a three-room cellar. It was built with large logs, larger than those in Lagmannsstova according to an unpublished diary note from 1811 made by Johannes P. Aga:

> En fortelling eller beskrivelse vil jeg her innføre angaaende 2de ældgamle husbygninge her på Aga, og som i dette aar er nedrevne. De var stående i øvre tun. 1/en stue, tømret, i denne stue var stokkene omtrent 12 alen lange stokkene var en alen og derover brede, den var meget skjøn og sirlig bygget, og paa forskjellige steder ziret med bildhuggeri. 2Det et loft (kaldet) med rommelige omgange, stående på 3de ovenpaa jorden murede kjeldere som var oppbygget med megen konst og styrke, så at de endnu efter så langs tids forløb stod som kirkemure, saa at disse bygninger, som saa eldgamle viste tydeleig at bygningskonsten paa de tider har været i flor. I ovennævnte loft var en af stokkene en og en fjerdedels alen brede.

The building consisted of a hall, a loft and a chamber. The loft would probably be twisted against the length of the house like the chapel, and with a similar high lofted roof. This made the two buildings twins, with the exception of the kitchen that was attached to Lagmannsstova, separated by a court yard.

The building complex at Aga must have made quite an impression on those who came sailing along the fjord. Not only because of the number and the size of the buildings at Aga, but also because anyone who had been to Bergen would see the resemblance between Aga and the royal castle at Holmen by the entrance to the Norwegian capital. Here two parallel halls also made up the heart of the complex, with the difference that the castle was all built in stone. And anyone who had been to rural administrative buildings would recognize the constellation of rooms devoted to different functions: (kitchen,) hall, church and private chamber. This is the same model as Professor Egon Wamers describes in his article on 'Carolingan Pfalzen and Rights': aula, chapella and camera. All in all, Aga

drew its authority not only from the number and size of the buildings, but also from the continental tradition that also shaped the castle in Bergen.

Aga was not unique in the Norwegian realm in the High Middle Ages. As already stated, similar halls and building complexes could be found at the nearby Sponheim and at Kvåle in Sogn. At Talgje in Rogaland, the Stofa at the Biggins on the island of Papa Stour, Shetland, and Kirkjubøur in the Faroe Islands we also find a similar building tradition connected to royal or ecclesial administration. What makes Aga unique is the degree of preservation and the amount of sources that enable us to reconstruct its appearance in the thirteenth and fourteenth centuries. However, through excavations Aga's uniqueness may be reduced through the acquisition of more knowledge on the building of royal administrative centres in the hands of aristocrats.

The position of the appeal court judge in Norwegian law post 1274

In 1293, Sigurd Brynjulfsson headed a panel to negotiate a truce in a conflict at the neighbouring farm Bleie. When the parties in the case, the witnesses and the general public came to Aga, it was, as we have seen, an impressive complex of buildings they walked towards, after landing their boats in a sheltered bay about 350 m to the north and following a road that passed between two ancient burial mounds, each probably with a stone monument on top. The authority of the building complex mirrored the authority of the appeal court judge.

What they would see would be both the home of an aristocrat and a public space. Aga was built as the home of an aristocrat who also became an appeal court judge. Hence his home also had a public function. For instance, in another civil suit in 1293, the parties met at Aga to have the appeal court judge decide their dispute in the capacity of judge, just as they could have taken the dispute to the local court at the assembly site (*Diplomatarium Norvegicum*, 1848 no. 99 and 100, 1852 no. 32 and 33, Diplomatarium Norvegicum). The hall of the appeal court judge was therefore a public room as well as part of his home. It could also be the other way around – at Papa Stour at the Biggins in Shetland duke Håkon Magnusson built the Stofa complex, much smaller than Aga, for public purposes, but it was later given to the sheriff Torvald Toreson as his property. It is still very likely that the Stofa had a cross private–public function right from the beginning (Crawford and Smith 1999, p. 30).

Sigurd Brynjulfsson was a *lagmaðr*, which literary means a lawman. There is good reason to believe that it is the title of an ancient function at the public assemblies, since we find persons whose task was to cite the law and advise the judges at assemblies in many parts of Europe at different periods of time, like the *brithemain* in Celtic law (Forte 2010, p. 139–142). The first time we find the term *lagmaðr* used is actually in a Celtic source from the second half of the tenth century (O'Donovan 1856, pp. 698–699, Wolf 2007, p. 212). In Norway, there might have been persons with such legal tasks in different public assemblies, but a firm and continuous tradition of lawmen can only be documented in the provincial assemblies, the *lagting*. From the end of the twelfth century the lawmen became royal officials, and their power increased during the thirteenth century until their judgement was made an alternative to the local courts at the local assemblies by King Håkon VI Håkonsson's New Law of 1260 (Sunde 2005, pp. 119–121 and 163–166).

The lawmen were legally skilled advisors and could by 1260 act as judges if one of the parties in a conflict so desired. We can see that this arrangement was not accepted by all from the fact that this law states that the King has been made aware that some people do not appear before the lawman when summoned (Keyser and Munch 1846, p. 124). In other words, the arrangement had been in force without being an unconditional success. Still, a leap in the power and status of the lawmen was made with King Magnus IV Håkonsson the Lawmender's Code of the Norwegian Realm of 1274, and they became more like appeal court judges than lawmen.

The arrangement of the New Law of 1260 was repeated in I-11 of the Code of 1274. This means that the appeal court judge would judge at the first level in the hierarchy of courts. The code was based on an idea of appeal bringing cases decided by the appeal court judge or the local courts to *lagtinget*, now more an appeal court than a public assembly. Here the lawman was no longer a mere advisor, but an equal to the judges, and thus turned into an appeal court judge with the Code of 1274. The task of the appeal court judge was to make a legal

statement that defined the case according to the law, hence he made a legal framework within which the ruling had to be. If the statement was found unlawful by the court, the co-judges could not rule against it; they could only write down their reasoning and send it to the king. Indeed, even the king could only replace the legal statement of the appeal court judge with his own if it was unlawful:

> No skytr maðr male sinu vndan logmanni oc til logðingis. þa ranzsake logretto men invirðiliga þat mal, oc þo at þeim synizt allum sa orskurðr eigi logligr er logmaðr hefir sagt þa skolu þeir eigi þo riufa logmanz orskurð, en rita skulo þeir til konungs huat þeim þickir sannare i þui male, oc slikt ranzsak sem þeir hafa frammast at profat. þui at þann orskurð sem logmaðr ueitir ma engi maðr riufa nema konungr se at logbok uar uatte mote. (Keyser and Munch 1848, I-11, p. 21)

'When a man takes his case to the appeal court judge and the appeal court, the appeal court jury shall investigate the case. Even if they all find that the appeal court judge's legal statement is unlawful, they shall not disregard it, but write down their opinion and reasoning based on the evidence, and send it to the king. Because no man shall judge against the legal statement made by the appeal court judge except the king, if he finds it unlawful.'

But this was not all. In IV-18, the power of the appeal court judge was greatly expanded: Not only could the appeal court judge serve as an alternative to the local courts, he would also have the power to censor their decisions in all major cases:

> En þui er domren til nefndr at þa skal sakir mæta oc misgerningar oc tempra sua dominn eptir malauoftum sem þingmenn oc rettare sea sannazt firir guði eptir sinni samuitzku. En eigi eptir þui sua sem margr snapr hefir suara her til at þeir doma ecki annat en log. (Keyser and Munch 1848, p. 62)

'And the judges are appointed to measure cases and misdeeds, and temper the sentence according to the circumstances in the same manner as the men at the *þing* and the official providing justice find most truthful in the face of God and conscience. And not, as has been stated by the fool, that they judge only according to law.'

IV-18 does not give details on the procedure when making the kind of decision the provision deals with, but this was done in an additional law of 1280, which reads:

> Goymi oc varezt vmboðs menn inuirðiliga at hueruitna þar sem menn er at doma vm stor mal om lif manna eða lima lat eða aðrar storar refsingar at þeir nefni xij menn til doms huarke sakaða eða siuiaða uiðr þa er vm skal doma en þeir xij gange einsamnir og staðfesti sua dom sinn. Siðan ganga þeir aptr til annara þingmanna og samðycki þeir þa allir iamsaman domin með lofa take. (Keyser and Munch 1848, p. 9–10)

'Those providing justice should take care, and especially beware, that whenever men are judging major cases involving human life or limb-loss or other major punishments, they should name twelve men for a jury (*dómr*), neither foe nor friend to he who shall be judged. And the twelve should go alone, and so establish their judgement. Later, they go back to the other men of the assembly, and they should together consent to the judgement.'

The same procedure is outlined in an amendment to IV-18 in a mid-fourteenth century manuscript of the Code of 1274, where it is stated that:

> En þæn tima er men doma a þinghi eðr a stemfno um lif eðr lima laat eðr adrar efsinghar eðr þiofnad, þa skall loghmaðr ef han er ner, ok j hia staddær næmfna tolf eðr sex til doms, sysslu maðr ef loghmaðr er æighi til, ok dome þætt maall, ok ganghe allar saman, ok þa er þæir værda samdoma þa ganghe æftr till þinghmanna ok biði þa samþykkya þenna dom. (Keyser and Munch 1848, p. 63 note 30)

'But when man shall judge at the *ting* or at summons in cases concerning life, limb-loss or other punishments or theft, the appeal court judge shall, if he is near by, appoint twelve or six men as jurors to decide the case. The sheriff does this if the appeal court judge is not near by. They shall decide the case by sitting together, and when they have reached agreement, they shall return to the other men at the *ting* and ask them to approve of the decision.'

Now, if we read these provisions together, we see that the appeal court judge was to appoint the jurors who propose a verdict to the local court 'in major cases involving human life or limb-loss or other major punishments', as it is stated in the additional law of 1280. After hearing the evidence, the jurors were to withdraw from the court to discuss and reach a decision. When returning they proposed a verdict to the court, which then approved or rejected it. But the appeal court judge also had to approve. Hence, he was given the same power in major cases in local courts as at the appeal court – through his legal statements he could define the character of the

case, and hence make the framework for the discussion of the jury and the decision of the court.

It is important to notice that IV-18 does not speak of the appeal court judge, but of the 'rettare', meaning the official providing justice. The term 'rettare' appears for the first time in an additional law from 1271 (The Norwegian Code of the Realm X-2), and was most likely a translation of the roman term *judex*, just like the legal statement of the appeal court judge, *orskurðr*, was a translation of the Latin *decisio* (Robberstad 1976, p. 147). Still, 'rettare' and the appeal court judge do not have to be one and the same office, since it could also be the sheriff, who acted as public persecutor and was responsible for administrating justice (Storm and Hertzberg 1895, p. 516, Taranger 1979, p. 58 (note made in the text of IV-18)). But, as we saw from the amendment to IV-18 in the mid-fourteenth-century manuscript of the Code of 1274, the role of the 'rettare' was supposed to be performed by the appeal court judge:

'Đa skall loghmaðr ef han er ner, ok j hia staddær næmfna tolf eðr sex til doms, sysslu maðr ef loghmaðr er æighi til.'

'The appeal court judge shall, if he is nearby, appoint twelve or six men as jurors to decide the case. The sheriff does this if the appeal court judge is not nearby.'

Nevertheless, the Code of 1274 ensures both offices a major increase in legal status and power. The most important change in the competence of the sheriff was made in the additional law of 1280. Firstly, a sheriff could propose a fine to a suspect in a criminal case before charges were brought to court. Secondly, the sheriff could summon the parties in a civil dispute and propose a settlement. If these proposals were not accepted, the matter could only be settled by a legal statement from the appeal court judge (Keyser and Munch 1849, pp. 8–9, law of 1280 art. 24). And this was the usual order of things – the two royal servants would work together, but with the appeal court judge as the superior in judicial matters. According to the *Administrative Code* of 1277 the sheriff should give advice, but the appeal court judge decided in cases involving harm done to commoners by the king's men (Imsen 2000, chapter 29/34, pp. 126 and 127). According to the additional law of 1280, the sheriff and appeal court judge were to decide cases concerning debt, and property claims involving both clergy and laymen (Keyser and Munch 1849, p. 8, law of 1280 art. 23). And in an additional law of 1314, the sheriffs and the appeal court judges were to redefine a punishment when someone had failed to pay fines for breaking the clothing code (Keyser and Munch 1849, p. 110, law of 21.10.1314, Seip 1934, p. 68).

Against this backdrop it is no surprise that we find evidence of building complexes like the one at Aga as the home for aristocrats holding the sheriff's office. An example would be the previously mentioned knight and sheriff Peter at Sponheim, the brother in law of the appeal court judge Sigurd Brynjulfsson, who also had a hall built on a stone cellar like the one at Aga (Ekroll 2006, p. 201).

The legal powers and status of the appeal court judge were even greater than controlling all but minor cases in local courts – he also had the last word when filling the lacunas in law. In I-4 in the Code of 1274, it is stated that lacunas are to be filled by the court. But if the court cannot unanimously agree on one norm, the appeal court judge will have the last word, unless the king and his advisors find another norm more legal.

In minor cases that were not to be brought before the appeal court judge, the sheriff could summon the suspect or the parties to him and propose a settlement. If not accepted, the appeal court judge would decide the matter. In other words, there were no cases that could not be decided by the appeal court judge as long as he and the sheriff cooperated (Sunde 2014, p. 143–153).

Again we see that the appeal court judge is positioned far above all the other participants in the legal system. Nevertheless, his powers were partly dependent on cooperation with the other royal servant within the legal sphere, the sheriff. And he was subordinate to the King. But even the King had to argue if he finds the legal statements of the appeal court judge, in cases or in the lacunas of law, unlawful or less legal than his own. Still, the entire arrangement was made by the King to ensure the realisation of his politics through application of the laws he made. The legal status and powers entrusted to the appeal court judge, but also the sheriff, were thus a transfer from the political status and powers of the King. This, just like the building complex at Aga, appeared in the landscape as a smaller version of the King's castle in Bergen.

Building legal status and power

When the legal historian Fredrik Brandt wrote the first article on the development of the Norwegian judiciary in the early 1850s (Brandt 1851–52, p. 108), he noted the importance of both I-11 and I-4 in the Norwegian Code of the Realm of 1274, and concluded that these were legal powers and status that the appeal court judges developed almost organically, and in the interest of both court and judge. Downplaying on the importance of IV-18, and stressing the organic development and mutual interest, Brandt manages to depict the changes in the Norwegian judiciary in 1274 as a lot less radical than they actually were. Hence it was possible to uphold the image of a non-aristocratic, free peasant society.

There is no direct relationship between the thirteenth century building complex at Aga by the Hardangerfjord and the article by Brandt from 1852. Nevertheless the question must be asked: Would Brandt have looked more closely at the Code of 1274 for more traces of transfer of legal status and power to the appeal court judge, and would he have been less inclined to see this transfer as organic development, if his image of Norway as an egalitarian society – a nation with cottages and houses and no castles – had been challenged by knowledge of the appearance of Aga in the thirteenth and fourteenth centuries? The question is relevant not only for how we perceive the legal status and power of the Norwegian appeal court judge, but also for the relationship between archaeological and written sources. The real matter on the agenda here is: Would we read the written sources, in this case the Code of 1274, differently against an archaeological backdrop proving that next to the houses and cottages were impressive building complexes that served as the home of aristocrats that exercised royal power in the provinces?

Notes

1. Christian Magnus Falsen, *Norges Odelsret, med Hensyn paa Rigets Constitution* (Bergen) 1815: especially pp. 61–63. See as well Gustav Ludvig Baden, *Det Norske Riges Historie* (Copenhagen, Schubothe) 1804: 45–54, and Tyge Rothe, *Nordens Staetsforfatning før Lehnstiden, og da Odelskab med Folkefrihed – I Lehnstiden og da Birkerettighed, Hoverie, Livegenskab med Aristokratie, Første Deel* (Copenhagen, Gyldendal) 1781: 121–135 and 234 (speaking of the Nordic constitutions, and then including Sweden, Denmark and Norway).
2. Gjert Hendriksen Miltzow, 'Voss og Hardangers Prestehistorie – Oversat og forsynet med Anmerkninger samt en Skildring af Forfatteren', in *Voss Sogelag* 1911: 55: 'Staar ogsaa endnu i god Stand, bygget med stor Konstferdighet og Dygtighed og af middels Størrelse'.

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RESEARCH ARTICLE

The background of the odal rights: an archaeological discussion

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ABSTRACT

The age and origin of the odal rights known from medieval times in Sweden and Norway are debated. Archaeologists tend to view them as old and a part of the pre-Christian society, whereas historians and legal historians view them as established after Christianity was introduced, mirroring canonical laws. In Viking Age runic inscriptions from the eleventh century in the lake Mälaren valley in Sweden, from late tenth to eleventh century in south-western Norway, the term odal, inherited family land occurs together with other expressions concerning landed property. Furthermore, two runestones in Småland and Hälsingland in Sweden, *c*. 650 km apart, each enumerate five earlier ancestors in a male lineage, the sponsor himself being the sixth generation. As these runic inscriptions were made in different parts of Scandinavia during the late tenth and eleventh century, this indicates that the term and concept odal was widespread already before the canonic laws of the early medieval period were introduced, and quite possibly belongs to an older inheritance structure. The aim of this article is a renewed discussion focussing on the runological sources where the term and concept odal can be found in the Viking Age Scandinavian society (*c*. 750–1050 CE), but also early medieval written sources. Thereafter, archaeological sources from the Late Iron Age are addressed (*c*. 550–1050 CE).

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State of research

Ownership of land can be defined as the right to more permanently decide and dispose of the land. In pre-Christian times, such claims were reflected in visible graves and oral traditions connected to them. The *oðal*[1] right known from medieval times in Norway and Sweden concerns the individual landed property of a family. Land would count as odal if it had been passed down through five generations of the same family, and became odal in the sixth, as the older Gulathing Law of early twelfth century western Norway states. Requirements were relaxed somewhat and according to the Frostathing Law of central Norway of the late twelfth century, only three generations were needed (NGL I, 91, 237; Robberstad 1967, Lindkvist 1979, p. 142, Gurevich 1992, p. 194). This right was not dependent on the size of the property, but a direct result of the individual's relationship to earlier generations (Gurevich 1985, p. 45). Odal could also comprise waters and stationary fishing works that belonged to the land (Hafström 1962, p. 502, Robberstad 1967, p. 493). Sons inherited shares in odal land, while daughters did not share in the family land, but inherited outlying land (Sjöholm 1988, p. 128).

Several historians and legal historians agree that the concept of *odal* existed in pre-Christian Scandinavia. A general opinion however is that a proper right – *odelsret* – was only established after land started to be bought and sold (e.g. Robberstad 1967, Helle 2001, p. 119f). The *odelsret* prevented the inherited land from being sold without the consent of the relatives; if land nevertheless was sold, they had a right to redeem it. It is known from the provincial laws in Sweden as *bördsrätt*, and in Danish laws as *lovbydelse* (Gelting 2000). This type of right is known also from France and Germany (Norseng 1987, Gelting 2000, see Vogt 2010, p. 209–211). As the *odelsret* seems to follow the limitations of kinship in the canon law, legal historians generally consider it to have reached its final form after Christianity was introduced (Vogt 2010, p. 211–215 for a full discussion). Historian Knut Helle likewise considers the *odelsret* as connected with the Christian social order. When the Gulathing Law requires that land should have passed through six

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generations, it is probably connected to the fact that marriage between relatives was not accepted until the seventh generation (Helle 2001, note 18).

Legal historian Helle Vogt has expanded the discussion by suggesting that one of the aims of the introduction of legislation in the Scandinavian kingdoms was to establish an 'ecclesiastical definition of kinship'. This canonical kinship is viewed as an alternative to the more loosely defined kinship ties based 'on blood, friendship and alliance'. Although stressing that the borders between the two types of kinship systems were fluid, she regards the Viking Age social structure as frail and lacking a firm definition of kinship. Instead, it was characterized by its elective- and alliance-based kinship (Vogt 2010, p. 11–14, 259).

Contrary to this, there is a widespread opinion among archaeologists and some historians of religion in Sweden and Norway that there existed a property right during at least the Viking Age that was called *odal* (e.g. Skre 1998, Iversen 2004, Bratt 2008, p. 161, Löwenborg 2012, Sundqvist 2016, p. 448). I have earlier argued that inherited rights were articulated and manifested, especially through grave mounds at burial grounds of farms and manorial estates in the Late Iron Age (*c.* 550–1050 CE), and that these types of manifestations could be connected to the concept of *odal* (Zachrisson 1994). The fact that the term *odal* is widespread among the Germanic languages speaks for its old age, but also underlines its complexity. From the viewpoint of the *odelsret/bördsrätt* only, it has been argued by Christer Winberg that *bördsrätt* cannot be reduced to a mere right in cases when landed property was unrightfully sold. In the written law cases, *bördsrätt* carried a double meaning – either potential right to ownership or actual ownership (Winberg 1985, p. 237–239, see also Vogt 2010, p. 210). That in itself implies that the concept of *odelsrett* – actual *odal* could be embedded in the inheritance traditions and social framework of pre-Christian Scandinavia. The legal society of Viking Age Scandinavia has been in focus lately in the Assembly-project (Sanmark 2017) and there is a renewed interest in early law in Scandinavia (e.g. Brink and Collinson 2014) which encourages a discussion on land rights on the background of the legal Viking society.

Methodologically, the vision that chaos and disorder was at hand before the Late Viking Age when Christian rulers came to power and gradually established law and societal order, also concerning inherited family land may seem attractive. But the archaeological source material from especially Sweden and Norway: data from the Late Iron Age agrarian landscape, from burial grounds in Norway and Sweden and the knowledge about the social order of Scandinavia offers resistance to this view (e.g. Foote and Wilson 1970, p. 80–82, Øye 2002, p. 226–228).

If the odal rights were a late 'loan' and influence from the Roman Catholic Church, it is difficult to understand why the concept could have spread so quickly and be found in different parts of the Scandinavian countries already early in the eleventh century as will be shown below. These runic inscriptions also indicate that the words used for expressing odal rights may have been taken from the oral predecessors of the written laws. Was the number of generations enumerated, a trait that rested on the canon law only? Or could the same amount of generations be articulated when property rights were defended already in the Late Iron Age? And these inheritance rights were named *odal* by the contemporary society? Below I will try to address these questions, but first some words about the concept *odal* and its historic roots.

The word odal

Old Norse *odal* is usually understood as inherited landed property, family estate, allodial property (Taranger 1913, p. 159f, de Vries 1961). The word *odal* attested in Swedish runic inscriptions is likewise translated as 'odal (jord)' (Peterson 2006). Linguistically, it is related to words like *ädel*, noble and *adel*, nobility (Robberstad 1967, p. 493–494). Etymologically, the word is of unclear origin, but may indicate some sort of identification between the inherited land and the deceased relatives from which it derived (Foote and Wilson 1970, p. 81). The fact that the word is widespread among the Germanic languages – Protogermanic, Old High German, Old Saxon, Old Anglo-Saxon, Old Nordic etc. – speak in favour of its old age. The last rune in the early runic alphabet that emerged *c.* 0–100 CE was called *odal* (Williams 1996a, 1996b, Fischer 2005, p. 47), while the first rune F was called *fé*, 'wealth', 'cattle'. Movable wealth and landed

property, of fundamental importance for Germanic peoples, thus marked the beginning and end of the elder futhark (Eriksson and Strid 1991, p. 12). Although it is assumed that the rune names go back to the time of the creation of the runic alphabet, they are however not preserved from this early date. The Old English names are known from Anglo-Saxon and Continental manuscripts from the eighth century and the Scandinavian names from the ninth century (Düwel 2001, p. 197–202). However, the O-rune does not occur in Scandinavian runic inscriptions to denote the word odal.

It goes beyond the frame of this article and my knowledge to set the concept *odal* in a Continental framework and compare it with the concept of *allodial land*, inherited family land, known from the early Germanic laws. These laws favoured male lineages and in principle denied women of control of landed property, of inherited family land (e.g. Nelson and Rio 2013, p. 111). This gave effect also on who was allowed to come to power, and how royal successions took place. The northern part of Scandinavia is often, also by us scholars working with it, thought of as a periphery that only gradually received modernity. But, we always tend to underestimate the social structure of the time, and the far-reaching networks these societies were involved in. In the period after *c*. 550 CE, there were very close connections between the Anglo-Saxon realm, Merovingian France and Mid-Sweden (Vierck 1981, p. 94, Ljungkvist 2008, Näsman 2008, p. 39). Fostering, marriage alliances, trade networks, hostages, members of warbands, part-taking in foreign body-guards, craft-exchange are all examples of contacts that very likely took place which opened up for a wider transmissions of ideas around property rights.

Written sources connecting with a pre–Christian setting for the concept odal

The Icelandic writer and chieftain Snorri Sturluson (1179–1241) describes *holdar* as 'yeomen who have full status as regards their lineage and all their legal rights' (Snorri Sturluson Edda p. 129). According to him, the Norwegian kings perceived the kingdom and the country as their odal. Óláfr Tryggvason (r. 995–1000), Snorri wrote, was *ódalborinn til konungsdóms* (*c*. 1230, Heimskringla II, Ísl. Fornr. 27, p. 47, 1992, p. 38, Snorri Sturluson Heimskringla). *Ódalborinn*, 'by birth entitled to the kingdom', *foðurarf* 'paternal inheritance' and *langfeðgatall*, 'people who follow each other, the son after the father of the same lineage' occur in the same text about Óláfr Haraldsson (r. 1015–1030, Heimskringla II, Ísl. Fornr. 27, p. 43f, 1992, p. 35), which demonstrates the strong link between the royal genealogies and the country/kingdom as paternal inheritance (Sundqvist 2002, p. 174f). That kingship was thought of as *odal*, is attested in eleventh century scaldic poetry (Sundqvist 2016, p. 451).

For a long time, Snorri Sturluson's texts were considered useless as sources for the Scandinavian pre-Christian society, as they are indirect sources, written by him, a Christian, more than two hundred years after the conversion of Iceland (Sundqvist 2016, p. 23–25 for a discussion). Likewise were the provincial laws of Scandinavia thought to mirror canonic laws and reflect almost nothing of the Late Iron Age legal society of Scandinavia (Sjöholm 1988). Today, these written sources are used critically in combination with a source-pluralistic method thereby not totally rejecting or totally approving them, but moving forward in a middle way, sorting different time layers and contexts not least by the identifiable material objects and actions referred to (Sundqvist 2016, p. 25).

If a person's property rights were threatened in medieval times, the individual should orally declare his lineage back to heathen times. This was done by 'enumerating the ancestors possessing the land from the time of the burials in mounds' *til haugóðals at telia*, as it is formulated in Magnus Lawmender's Norwegian Law of the Realm (1274) (MLL, ch. 16) or *langfeðga tall. till haughs ok till heiðni* 'count the ancestry back to the mound and heathen time' as Håkon V's Law (1316) declares (NGL III, p. 121). The right had to be defended through oral memory, and the grave mound held a special position as the materialization of a family's affiliation to the land (Gurevich 1985, p. 45). Old Swedish provincial laws from the Middle Ages, as the Older Västgöta Law (1225) mentions settlements of special dignity *høghae byr ok af heðnu bygdaer* 'villages with burial mounds settled in pagan times'. This expression also occurs in the Östgöta Law (1290), *gör by ok gamall, høgha byr ok heðnu byr*, 'a village, settled and old, village with mounds and from pagan times' (*Svenska landskapslagar* Ä VgL, J, 339,

ÖgL, B, 217). This implies that the potential right to ownership and the actual right both were perceived as having been established in heathen times. The grave mound seems to have had a symbolic role in inheritance claims regarding landed property.

Medieval Norwegian laws state that if two persons claimed *odelret* a trial was held, in which genealogies played a fundamental role. This type of conflict is addressed in the Eddic poem Hyndluljód, the lay of Hyndla and set in a pre-Christian divine context. In the poem, Ottar is challenged by Angantyr, and has to describe his lineage to win the lawsuit, which is determined by arbitration by a genealogical investigation. The goddess Freyja, who has doubts about him being a descendant from the gods, questions Ottar. Hyndla helps Ottar remember and rehearse his lineage, and he has to give account for his ancestors, both maternal and paternal as well as ties to the royal families of the Nordic realms: the skilfingar, ynglingar and skjoldungar (Gurevich 1992, p. 190f, Sundqvist 2002, p. 172f, Cöllen 2011, p. 202). Ottar has to enumerate his five ancestors: Innsteinn, Álfr, Úlfr, Sæfari and Svan raudi, and he himself being the sixth generation (Brink 2002, p. 104). He thus acts as is stated in the Gulathing Law: 'Now when the doom is set, (the claimant) shall enumerate his ancestors, the five who have owned the land, and the sixth who had it both in ownership and in odal' (Brink's translation cited Sundqvist 2002, note 187).

Above all does the Old Norse god Heimdallr represent ideas on descent and order, thus personifying many of the aspects linked to the concept *odal* (for a full account, see Cöllen 2011, p. 201–219). The documented traditions on the god reflect his quality as ancestor. Heimdallr has long been regarded as an enigmatic god, but as has been shown the god quite probably represented a more clearly definable and eminent figure in pre-Christian time, than previously thought (Cöllen 2011).

The late Viking Age runic inscriptions mentioning odal

One of the most famous runic inscriptions that explicitly mentions *odal* is found in Nora, Danderyd parish in Uppland, Sweden (U130, Figure 1)[2]. The inscription states that: 'Biorn, Finnvið's son, had this rock-slab cut in memory of Olæif, his brother. He was betrayed at Finnheiðr. May God help his spirit. This estate is

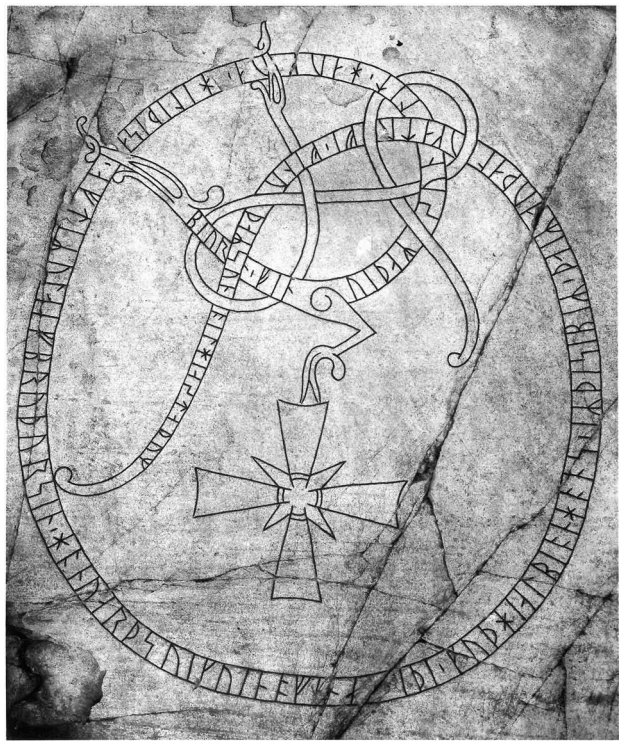

Figure 1. The word pair *oðal ok ættærfi* is found in the upper right part of the inscription from the crack in the stone to the left part of the loop made by the smaller snake. This means that the first part of the inscription, from the rune animal's head and onwards, which carries the name of the sponsor *biorn finnviðar sun* 'Biorn, Finnvið's son' enters under the rune ribbon at the word *ættærfi* 'family inheritance' (U 130 Nora). Photo: H. Faith-Ell, 1934, ATA.

the allodial land and family inheritance of Finnviðr's sons at Ælgiastaðir. '*Er þessi byR þæiRa oðal ok ættærfi, FinnviðaR suna a Ælgiastaðum*'. The inscription is placed on a rock by the Viking Age shoreline at the bottom of the harbour bay at Nora. The main farm however seems to have been Älgesta, since the brothers call themselves Finnvid's sons of Älgesta. This settlement is situated 36 km to the northwest. There Björn had a runestone raised over himself (while he was still alive): '*Biorn, FinnviðaR sunn, let ræisa stæin æftiR sik sialfan*' (U433); presumably to declare his rights to Älgesta. Both inscriptions were probably hewn *c.* 1070–1100 CE (Gräslund 2002, p. 144).

Why was it necessary to state: allodial farm and family inheritance? Did the words have different meanings or were they synonymous and intended to give extra power to the expression? The runologists Elias Wessén and S. B. F. Jansson state that *arve*

in ancient Swedish and Danish implies inheritance, inherited estate, landed estate, as well as inheritance ale (the inheritance ale/beer, i.e. the name of the burial feast, U130). I have earlier suggested that *ættærfi* could stand for the more concrete of the two words and be synonymous with the inheritance as well as the rituals by wich the inheritance was handed over to the next generation. Odal, I then argued, would stand for the more abstract of the two and signify the odal right (Zachrisson 1994, p. 6). The type of word-pair and alliteration *oðal ok ættærfi* are however found in the law codes in the provincial laws where they often can denote a uniform concept, like *arf ok orf, eld ok æril, liþ ok leþung, roþ ok reþ* (UpL Kg comment 30, Ä comment 39, Brink 2005, cp. Ståhle 1956, 1958, 1965). It has been discussed in detail if these types of rythmic structure and alliterations are old, or instead young, learned contributions to the law. Today, it is agreed that alliteration was used in medieval writings, but could also be regarded as an archaic level in provincial laws (Brink 2005, p. 93, 98). It is thus quite possible that the expression *oðal ok ættærfi* belongs to an oral legal context and that Björn strengthens his case by using the type of mnemonic tools that were in use in the oral past of the predecessors of the written laws.

In Eneby in Runtuna in Södermanland, a now lost runic inscription (Sö145, Figure 2) declared: 'Tosti (and) Øystæinn, they raised (the stone) in memory of Tóki. The sons made in memory of their able father. Tóki owned half of the estate, Grímulfr owned (the other) half of the estate as ancestral allodial land'. The runestone was carved on both sides. It is depicted in *Rannsakningar efter antiquiteter* (1969, p. 18), around the year 1683). The most important source for the Eneby stone is the woodcut in Bautil produced by Johan Peringsköld and Johan Hadorph two years later, in 1685. There the runestone can be seen standing at Eneby, by the road with the church in the distance, and also by the brook that constituted the settlement boundary to the south (compare lantmateriet, the historical maps from Runtuna, Inneberga village 1687, and Eneby village from 1769). Normally, one would have anticipated that the runestone would have been placed with the beginning of the inscription facing towards the road (side A), but instead the second side where the property rights concerning the village were clarified was what met the people passing by (side B) *'Toki atti by(?) halfan(?), GrimulfR atti halfan(?) by (?) alda(?) oðali(?)'* [**: tuki: ati: ru harfan: krimulfu:: ati: hafan: iu: ata i:: uþuli**]. The word odal has been given special attention. It is found in the centre of the composition on the stone, placed on a rune staff crested with a schematic head of a rune-snake flanked with palmettes; a symbol for the cross that will flourish, that is the resurrection (Zachrisson

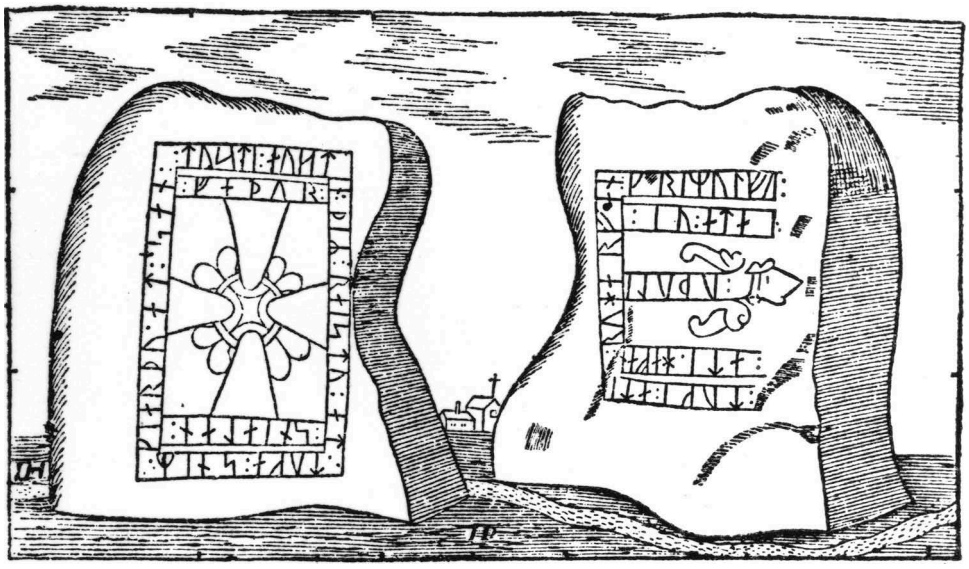

Figure 2. The word odal is placed on the side of the runestone that was facing the road, i.e. to the right in the woodcut. The runes, **uþuli** *odal*, allodial land, are found in the centre of the composition, on a rune staff crested with a schematic head of a rune-snake flanked with palmettes. Sö 145 Runtuna after Bautil a wood cut by Johan Peringsköld and Johan Hadorph from 1685. ATA.

1998, p. 142). This ornamental style is used on the oldest zoomorphic runic inscriptions of the type called Pr1 dated to *c.* 1010–1040 CE (Gräslund 1992, p. 143).

Helmer Gustavson has briefly discussed the inscription and the drawing in Rannsakningar: *Toki ati by halfan. GrimulfR … ati halfan oðal'* [*ati* should be *atti*] Gustavson interprets as 'Toke owned half the village. Grimulv … owned half as allodial property'. He thus leaves **iu: ata i**: (see above) out of the translation (Gustavson 1995, 113–124). Sophus Bugge suggested in Runverser that **ata** in **ata i:: uþuli** would mean *ætta(r)*, but Erik Brate found it more plausible that **i** is a misinterpreted line of the runic ribbon, and that **l** had been dropped before the **t** giving the word **alta** (Södermanlands runinskrifter1924–36, p. 82). The expression **ata uþuli** should therefore, he argued, be understood as **alta uþuli**, the old lawterm OSwe *alda oðal* (*Svenska landskapslagar*, UpL J I.). Brate's interpretation is currently used for instance in the Scandinavian Runic-text Database.

The road that passed by the runestone was one of the main roads (Strängnäs–Nyköping) through the province of Södermanland, probably also used as Eriksgata, the ceremonial journey of the medieval kings (see Sundqvist 2002, p. 316f). At the brook where the runestone stood raised, there is a smaller road leading south-east to the royal manor Upp-Husa (Oppusa)/Torsberga, neighbour to Eneby. The royal estate Upp-Husa houses a most prominent grave mound from the Iron Age: 'Uppsa kulle' is the third largest preserved mound in Sweden, and measures 55 m in diameter and 9.5 m in height. The mound is very exposed in the landscape above the strait Lövsund and the waterroute Runnviken. Mounds of these monumental dimensions usually belong to the period 550–625 CE; this one however, has not been excavated (Lamm 2006, p. 530, Bratt 2008, p. 65, Ljungkvist 2008, p. 277). In the close vicinity of Eneby, there were apparently other types of estates than the ordinary farms, and therefore it might have especially important to be clear about the fact that the property was old allodial property.

The expression *alda oðal* on the Eneby runestone has parallels in the old Swedish provincial laws. It might have been an expression used in lawsuits at Aspa löt, the assembly site of Rönö hundred, situated 5 km north of Eneby löt. This assembly site consists of a thing-mound and several Viking Age runestones, one of them mentions that the runestone stands at the thing-place: *Stæinn saRsi standr at Øpi a þingstaði at Þoru ver*. 'This stone stands in memory of Œpir, on the Assembly-place in memory of Þóra's husband' (Sö137). This runic inscription belongs to the early phase of the Late Viking Age runestone tradition, just like the Eneby stone, indicating that the thing-place was in use when the Eneby runestone was erected (Sö 137, Vikstrand 2015).

The runic text stated that Toke and Grimulf of Eneby each owned half of the village, and that at least Grimulf's part was old odal. This might be regarded as if a division of the odal land had occurred (Rønneseth 1975, p. 181). To own half a village is mentioned in yet other runic inscriptions. In Släbro, some 30 km from Eneby, another runic inscription stated that *Hamundr, UlfR ræisþu stæin þennsi æftiR Hrolf, faður sinn, Øyborg at ver sinn. ÞæiR attu by Sleðabro, Frøystæinn, HrolfR, þrottaR þegnaR*. 'Hamundr (and) Ulfr raised this stone in memory of Hrolfr, their father; Øyborg in memory of her husband. Frøystæinn (and) HrolfR, þegns of strength, they owned the estate of Sleðabrú' (Sö 367). Another runic inscription from Lerkaka in Runsten parish on Öland (Öl 37) in southern Sweden states that *Atti Unn hiar halfan by*, that Unn here owned half the village, also named Rich-Unn (cf. Selinge 2010, p. 52f).

At Oddernes in Vest-Agder in Norway, Øyvind, St Olav's godson, had a church built on his odal. 'Eyvindr, godson of Ólafr the Slippery/Crooked/Holy made this church on his allodial land' (N210). Eyvind has been identified with Eyvind Urarhorn, born *c.* 985 CE, mentioned in Snorri Sturluson's Kings' Sagas. The runic inscription may thus date to the beginning of the eleventh century. In Sele, Jæren, in Rogaland a runestone mentioning fishing places 'as property and as allodial land' … *at aign auk at oþli* (N236). The Viking Age runestones of Rogaland probably date to the late tenth or early eleventh century (Krövel 2001, p. 212).

A male or female called *Óðalfreðr* or *Óðalfríðr* **(u) talfriþʀ** has sponsored a runestone around *c.* 1010–1040 CE placed at Åkerby church in central Uppland in Midsweden: 'Óðalfríðr/Óðalfreðr raised these stones in memory of Styrr, her/his father. May God help their spirits. Brandr cut the runes'. Odal

was normally not used as prefix in Nordic personal names from the Viking Age, except in this case (Peterson 2007, p. 170–171). It is however used on the Continent around the same time, and a man Odalfrid was for instance the chancellor of the east Frankian king Konrad I (r. 911–918; Struck 1990, p. 53).

Genealogies presented in runic inscriptions

In Norra Sandsjö, Njudung in Småland Ärinvard had a runestone raised in the early eleventh century (Sm 71, Figure 3, Gräslund 2002, p. 154). This runestone was erected untraditionally, on top of a ridge overlooking the lake Sandsjön (Figure 4). The ridge belonged to the settlement Sandsjö, where a church later during the twelfth century was to be built (Ullén cited Zachrisson 2002, p. 35–45). The grounds south of the ridge carry traces of a complicated land use, according to agrarian archaeologists who made excavations in the fields. The change in farming system that they mirror occurred in the late Vendel Period/Viking Age (^{14}C-datings 678 ± 80, 891 ± 70 CE, Gren 2003, p. 150f). These landscape changes may ultimately have been why Ärinvard had to sponsor an unconventional runic inscription: *Ærinvarðr let ræisa stæin þenna æftiR Hægga, faður sinn, ok Hæru, faður hans, ok Karl, hans faður, [ok] Hæru, hans faður, ok Þiagn/Þegn, hans faður, ok æftiR þa langfæðrga fæm.* 'Ærinvarðr had this stone raised in memory of Heggi, his father and Hæra, his (i.e. Heggi's) father, and Karl, his (i.e. Hæra's) father and Hæra, his father and Þegn, his father and in memory of these five forefathers'.

Figure 3. The Norra Sandsjö runestone (Sm 71). Photo: Linus Blohmé, 2001.

Ärinvard acted as if his odal rights were questioned and enumerated his five forefathers. This is further underlined by the expression *langfæðrga fæm*, which can be translated 'persons that follow after each other, son after father in the same lineage for five generations'. In Icelandic Medieval literature, the word Old Norse *langfæðgar* was used for genealogies (Sundqvist 2002, p. 153f). Ärinvard is thus the sixth generation and presumably the first generation that had odal right. When counting hypothetical generations forward from the transformation of the agrarian landscape (i.e. oldest ^{14}C-datings ± 80 years) to the supposed dating of the runestone, Ärinward could quite possibly have belonged to the sixth generation. His personal name also differs from the other male relatives in the genealogical chain. Karl and Thegn can be titles or personal names, Härа means old age and Hägge, the bird-cherry tree (Peterson 2007, cf. Zachrisson 2002, p. 36f). Ärinvard's name in contrast is interpreted as eagle-guardian (Peterson 2007), a name that gives elite associations. Hunting with trained birds of prey was introduced in the Late Roman and Migration period, but normally goshawks and falcons were used. Using eagles was much more demanding, it was an equestrian technique that was imported from the east in the Viking Age. Bones of eagles are found in three high status male cremation burials from tenth century in Midsweden (Zachrisson 2002, 2010).

In Hälsingland, 650 km away from Sandsjö, Hæ-Gylfe, the father of Hromund, claimed and owned land as is described in a complicated runic inscription on the Malsta stone, recently interpreted anew

Figure 4. The runestone is standing on the ridge Runåsen. Photo: Linus Blohmé, 2001.

by Lena Peterson (2012): 'Hrō(ð)mundr erected this/these stone/s in memory of Hé-Gylfir, Brīsi's son. And Brīsi was Lini's(?) son. And Lini(?) was Unn's son. And Unn was Ófeigr's son. And Ófeigr was Þórir's son. Grōa was Hé-Gylfir's mother. And Bergl̨of. And Guðrūn. Hróðmundr, Hé-Gylfir's son coloured these runes. We sought this stone in the north in Balasteinn. Gylfir acquired this land and then in Vika in the north /further north three estates, and then Lønangri and then Feðrasjór' (after Peterson 2012, cp. Åhlén 1994). The five ancestors of Hæ-Gylfe are enumerated: Brīsi, Lini, Unn, Ofeg and Tore. In the two provincial laws from Sweden, the Uppland Law (1290) and the Hälsinge Law (*c.* 1320–1350), on the enactment on how to inherit property and who inherited from whom, the law says: 'This is the inheritance procedure until the fifth line or generation' (Brink 2002, p. 103–5, *Samling af Sweriges Gamla Lagar* Ä11, *Svenska landskapslagar*, Ä 11).

There exists a Runic Swedish word *langmøðrgu (R)*, female ancestors in three generations that probably was the female counterpart to the *langfæðragaR*. This type of female line is alluded to in a runic inscription from Södermanland, from the deserted church of Ärja (Sö176C). The inscription was probably once placed on one of the slabs of a stone-cist, a very unusual monument for Viking Age in Middle Sweden. The inscription was carved with short-twig runes and probably dates as early as to *c.* 900 CE. It states: '… each of the three ancestresses has six children, the best "*En hværiaR æigu langmøðrgu þriāR barn siax, bæzt*"'. This female line has been compared with a similar, cautiously suggested, ancestral maternal line in the Malsta inscription above consisting of three generations of females: Groa, Berglov, and Gudrun (Källström 2013, 152–153, cp. Peterson 2012).

The late Viking Age runestone tradition

Late Viking Age runestones belong in a Christian memorial tradition. The inscription, the materiality of the monument and its context together form and communicate the memory of deceased relatives. Nevertheless, runestones do almost exclusively convey a male memory (Sawyer 2002, p. 65), as if there were few women worthy enough to be commemorated. Birgit Sawyer has argued that runestones were intimately linked to inheritance rights of landed property (Sawyer 1988, 2000). She has identified a Danish-Norwegian-West Swedish pattern, and a contrasting East-Swedish-pattern where often several sponsors raised runestone together and women were more often included (Sawyer 2002, p. 66–68). But, it has recently been shown (Ljung 2016) that who is commemorated in the runic inscriptions changes over time as the runestone tradition moves from a landscape setting within a farm domain, to runic inscribed grave monuments erected at early Christian churchyards. In a landscape setting, the runestone was in contact with the landed property of the farm and a male memory expressing honourable deeds and qualities was communicated, and

distant relatives and in-laws were also mentioned. In a landscape setting, it was also quite normal for a man to be mentioned by his first name and the name of the farm that he was connected to, as some eleventh century runic inscriptions show: Björn in Granby (U338), Ugg in Svanby (U1146), Torsten in Skyttinge (Sö84) and Gunnar's son in Rissne (U382, Peterson 2007, p. 310–325). Women however were never commemorated by this type of reference. When in a churchyard context on the other hand, the runic inscriptions to a larger extent included women, but were restricted to the closest family relations and very rarely contained information on honourable qualities and such (Ljung 2016). To directly relate the general figures for all types of Late Viking Age runic inscriptions to inheritance patterns without a closer look at the contexts for them, therefore leads wrong. In the churchyards, grave monuments with runic inscriptions were placed over both men and women, and consequently, women then became truly visible, even though a majority of the deceased and sponsors of monuments still were men (Ljung 2016, p. 235).

The importance of family burial grounds in Mid–Sweden

During the tenth century, remarkably many grave mounds were erected in the whole of the Mälar Valley, especially in the part north of the lake Mälaren. This movement must have involved the entire landowning group (Bratt 2008, p. 174). Traditionally, grave mounds were erected over men since the sixth century, and this was still the case when men were buried alone in the tenth century (Bratt 2008, p. 74). Altogether this indicates that the social group behind the grave mounds, most probably free landowners, had been enlarged in the tenth century and opened up to include also new groups that earlier used to have been excluded.

At the same time, there occurred a reuse of earlier graves at the burials grounds, where later burials were placed on top of older graves; ritual actions that sought to connect with the past. These superimpositions were not randomly made, but formed patterns in time and space. The tradition started as a rare phenomenon during the Migration Period (400–550 CE) and became very common first during the tenth and eleventh centuries. It took place in the whole Mälar Valley and did not occur on 'shortlived' farms, but in the final phase of burial grounds established in Roman times or earlier, thus at settlements with a long continuity of often 500 years. The individuals in the overlying graves as well as in the underlying grave stood out from contemporary graves on the cemeteries and sometimes in the region. These individuals must, judging by their grave goods, have had high social positions, and thus inhabited prosperous farms. The times that were linked through the superimposition could cover considerable time distances, often coinciding with a hypothetical living memory of five generations (Hållans Stenholm 2006, 2012, p. 118).

The fact that the superimpositions show common patterns, Ann-Mari Hållans Stenholm argues, suggests that these 'were formal acts'. The tradition expressed cultural memories tied to certain historical individuals probably known by name, that were part of the social landscape of the living and dead belonging to the ancient farms (Hållans Stenholm 2012, p. 244). These farm owners seem to have been obsessed with commemoration rituals at their burial grounds, and Hållans Stenholm calls it 'memory mania'. The rise in the number of superimpositions in the tenth century could be explained as a social stress and reaction of the householders at these ancient farms who saw that their rights were questioned, or diminishing. In the tenth century, a large influx of Islamic silver also opened up possibilities to purchase land as runic inscriptions like the Veda-rock in Angarn, Uppland shows (U209, Zachrisson 1994, p. 235), which may have added to the tension in the group of landowners. Hence, it seems likely that the group of ancient farms engaged in commemoration rituals identified by Hållans Stenholm could be the very same that held property rights expressed as old odal in the runic inscriptions from the early eleventh century.

Regional burial rights

A few burial mounds were built in the fourth century in central Sweden, but the fifth century seems to be the breakthrough for the mounds (Bennett 1987a, p. 73). After a climate crisis in the 530s and 540s, monumental mounds started to be built. This first generation of large mounds was especially monumental and linked to specific sites, such as the

royal seat Old Uppsala (Bratt 2008, p. 63f, Ljungkvist 2008, 2013). It is known in the written sources as the seat of god Freyr and his descendants, the illustrious Ynglingar (Sundqvist 2002). The claim for legitimacy that the monumental kings mounds of old Uppsala express suggests that these claims were considerably greater and mirrored the establishment of a royal genealogy where property claims were related to a realm (Gurevich 1985, p. 198, Sundqvist 2002, p. 174, Zachrisson 2011a, p. 149, 2011b, p. 111). It can be compared with the claim to the ownership of different farmlands in the rural landscape. In the burial grounds of ordinary Iron Age settlements, the clearly coped burial mounds occur from the Early Vendel Period, *c.* 550 CE and onwards, very typical of Late Iron Age in central Sweden (Bennett 1987a, p. 21, 185). These coped mounds are constructed to be manifest and distinct in the landscape (Figure 5) and can be interpreted as expressing property claims. It seems reasonable to assume that at the *erfi* feast of the farm, the ancestors of the dead farm holder were enumerated, and that this had legal implication for the inheritance as a way of securing and legitimizing the succession of the farm.

Settlement changes were seen in Scandinavia in the wake of a climatic crisis, several volcanic eruptions, that occurred over a ten-year period with a start in 536–537 CE and had global impact (Gräslund 2007, Gräslund and Price 2012, Büntgen *et al.* 2016). This change may have had social consequences. Daniel Löwenborg (2012) assumes that there was a property right called odal in Midsweden before the social changes took place in the 500s. These property rights may have been redefined after the 530s, when there would also have been increased opportunities for private ownership of land. Bo Gräslund, on the other hand, views the strict requirements that seem to surround the early medieval odal rights, as a metaphor for ancient rights in general, which in practice had no significance other than when claiming rights to land, that had been deserted during the mid 500s (Gräslund 2012).

In the Early Iron Age, not all of the population was worthy of visible graves, but there was a balance between the males, females and children that were interred, roughly about one third of each group (e.g. Ljung 2001, Mejsholm 2009, p. 150). After *c.* 550, the pattern is very different, nearly no children at all were given a burial that left traces possible for archaeologists to detect (Mejsholm 2009, p. 153, 254–255). This together with the fact that especially men were buried in mounds and generally in graves that were of larger and more visible dimensions than those of the women underlines that male burials were made manifest in the landscape (Bennett 1987a, 1987b, Bratt 2008). Normally, the burial ground was placed within sight from the contemporary farm (Ambrosiani 1964). During the Late Iron Age, the farms were stationary in the

Figure 5. A burial ground from the Late Iron Age at Hammarby, Hammarby parish, Uppland characterized by its grave mounds (Raä Hammarby 54:1). Photo: Tomas Carlberg, 2016.

landscape (Göthberg 2000), indicating that the land was not split when inherited, but the family domain connected with the burial ground was kept intact. This goes well in hand with a society that favours genealogies and male lineages connected to a family burial ground, and strongly indicates that there were formalized regulations when a farm holder died and his landed property was moved on to the next farm holder in succession. The burial mound seems to have played an important role in the legitimacy requests in the provincial laws from the Middle Ages when property rights were questioned. Claims from the villages with burial mounds of old age from pagan times had priority over the requests from younger settlements (Selinge 1980).

My conclusion is that the concept odal is old and connected to inherited land. In Midsweden, it can be set in a Late Roman Iron Age context, intimately connected with the farm burial grounds of ancient and prosperous farms that remained in use from *c.* 300 CE up to the Late Viking Age and Christian times *c.* 1000–1100 CE (cf. Bennett 1987b, p. 154–155, Zachrisson 1994, p. 231). As Löwenborg rightly states, the large-scale events in the 530- and 540s with possible famines must seriously have affected the property rights, whether or not the Justinian plague also hit the Nordic countries. But the climatic crisis was not responsible for all social changes. Many lay already in the society that preceded it, but the climatic crisis could probably function as a catalyst, making the changes more profound than they otherwise would have been.

As a more formalized property right in the sense that it is alluded to in early medieval laws and runic inscriptions, the odal rights can be traced back to the societal changes around *c.* 550 CE following the climatic crisis. The beginning of the Vendel period saw much of the same economic boom as in the aftermath of the Black Death (Andrén 2014, p. 178–183). Property rights probably had to be renegotiated in a much more hierarchal society. *C.* 550–600 CE, the royal seat of old Uppsala in Midsweden was monumentalized with several large halls built on artificial plateaus and likewise monumental burial mounds, stating large claims of power. A 500 m^2 huge hall building has been excavated that was erected during the period of intense contacts with realms abroad. Archaeology shows that the milieu in Old Uppsala had information and networks addressing the region that they represented, but also alluding to elite behaviour on an over-regional geographic scale. The large assembly that took place in Old Uppsala for all Svear (Andersson 2004, for the svear, Nordberg 2006, for the assembly), the people of Mid-Sweden must also have been important as a mediator when formalizing land rights. This larger realm and new social setting, where mounds were so regularly built at the Late Iron Age burial grounds at the same time as children practically 'disappeared' from the burials, indicate that the property rights were formalized in the society that emerged in the Vendel period and Viking Age (550–1050 CE).

Property rights in Southern Scandinavia

The mound seems in Scandinavia to have been especially connected with property rights (cf. Skre 1998, p. 199–212) and much of what has been synthesized for the development in central Sweden has parallels in Norwegian contexts, although there burial mounds were built almost continuously from the Bronze Age and onwards (cf. Ringstad 1991, Bratt 2008). In Denmark, grave mounds were more rarely constructed during the Late Iron Age than in Norway and Sweden, but could occur in special social settings as in Jelling. Thus, property rights in relation to Late Iron Age burials and burial grounds have not been the focus of a similar discussion in Denmark. However, property rights in relation to Iron Age settlements have been discussed by several Danish archaeologists. The theme has especially been addressed by Mads Holst (2004); summarized 2010) in his thesis on the development of the large Iron Age villages on Jylland. For the household, family, inheritance and marriage restrictions played a vital role. Holst makes a simple model for how these principles could have been translated in the landscape, by using Germanic laws as analogies (Holst 2004, p. 197). It is assumed that each household had individual rights to a plot in the ownership system, which can be seen archeologically, and that these rights were subject to the same development as other property in connection with marriage and inheritance. Another assumption is that property was not split into smaller parts, as there are no

archaeological traces of such. A third assumption is that every new household formed by marriage was given the right to establish a new farm. This right did not have to be released immediately. The bilateral system, where the inheritance was distributed according to the real estate principles, resulted in a constant redistribution of land within the village community. All in all, the model can explain the dynamics of the constant redevelopment of farms and the abandonment of others, as well as the spread of farms in the domain over time. And, Holst emphasizes, this occurs without the intervention by any external control or superior power (2004, p.198).

Early on in the Pre-Roman Iron Age, one did not seem to have manipulated the ownership. But, the archaeological material seems to indicate that there gradually was a desire to keep the farm's property undivided by different marriage and heritage strategies. A strategic possibility was to allow inheritance of land to go to a limited number of individuals, for example sons. Several of the Germanic laws also indicate that there was an increased emphasis on the patrilineal side. Thus, during the course of the Iron Age, there probably was a shift from bilateral elements in the family inheritance to patrilineal (Holst 2004, p. 199–200). The large long houses that occur archaeologically also seem to indicate this, as more than one household probably inhabited them. Gradually, land accumulated through strategic thinking within the village system; changes were taking place and some farms grew. Those who stuck to the old way of forming new households with new farms scattered within the properties would slowly witness their property shrink, and land would gradually be transferred to the group representing the new strategies. During the Vendel period (*c.* 550–750 CE), according to Holst, some farms grew larger, while there were also small farms with short duration. The large manorial estates that occur during the Viking Age and early medieval period can be viewed as a continuation of the development where land was accumulated on ever fewer hands. Several of these processes later form the basis for the early medieval aristocracy (Holst 2004, p. 200). Holst does not associate these patterns with the odal right, but the strategic development and the gradual growth of certain domains that favour undivided land and strategic family planning could well be discussed against such a background.

Notes

1. The current Swedish term *odal* will hereafter be used in this paper.
2. The runic inscriptions in the article are translated into English according to the Scandinavian Runic-text Database, free to download from the website at the Dept. of Scandinavian Languages, Uppsala University, available from: http://www.nordiska.uu.se/forskn/samnord.htm

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RESEARCH ARTICLE

Early watermills – an archaeological indication of taxation?

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ABSTRACT

The introduction of watermills in Southern Scandinavia has often been linked to the advent of the Cistercian Order and regarded a kick-starter for the so-called medieval revolution. In the present article, the archaeological evidence for watermills predating the religious order will be investigated and an earlier and alternative origin laid out. Here, the increased specialisation and centralisation pertaining to the Late Iron Age and Viking Age will be introduced as a significant cause for the initial construction of watermills, and the extensive excavations at Viking Age Omgaard, Denmark, will figure as case in point. Also, essential social mechanisms such as taxation and elite privileges will be highlighted as overlooked triggers in the Viking Age employment of watermills.

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The chronological definitions of the Middle Ages vary greatly, and almost every country has produced more than one chronological demarcation of the period. This is testified to the great temporal gap between the traditional Italian definition, which contrasts with that used in Scandinavia, illustrating the different ways in which the Middle Ages has been defined. The former regards the establishment of Christianity as official state religion during the reign of Constantine the Great in AD 323 as a suitable starting point for the medieval era, whilst the Scandinavian definition usually views the Battle of Stamford Bridge in AD 1066, and the end of the Viking expansion, as a useful dividing line (Le Goff 1985, Näsman 2000). Behind any academic attempt to pinpoint societal changes or chronology lies the necessary definition of cardinal parameters which represent a comprehensible description of such developments. This is of course also the case with regard to a 'middle age'. Such parameters as religious (introduction of Christianity), governmental (removal of the last Roman emperor), academic (writing), economic (capitalism) or demographic (Arabic expansion) reasons have been presented as valid markers (Hermann 2002, Carelli 2004, Wickham 2005, Moreland 2010). This article will instead focus on the gradual introduction and advancement of new technological developments, which might have contributed to long-term changes in the political and legal systems. It is argued that new material phenomena can serve as markers of change in the social structure, because technology itself can contribute to societal transformations. More specifically, the early use of watermill technology in South Scandinavia will figure prominently in the paper, as well as the context of its introduction. The renewed excavations and research on the West Jutlandic Viking Age settlement at Omgaard will serve as a case study, because this location provides some of the earliest dating of watermill components in South Scandinavia and is located in a large settlement.

Technological development and social change

The introduction of the watermill has been central even to earlier academic studies of technological development and has often been combined with political viewpoints and statements. Depending on the view of the author involved, mills have been portrayed as, for example, the dark instrument of oppression. As stated by Karl Marx, mills were the obvious extension of the capitalist powers and an agent in their never-ending striving for hard cash

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and profit. He therefore states that 'The hand mill generates a society with feudal lords, the steam mill, a society with the industrial capitalist' (Marx 1907, p. 130),[1] thus clearly highlighting the inter-related nature of technology and socio-political structure. In a similar, yet also somewhat alternative vein, several historians of technology have focused on the opportunities presented by the watermill. For example, mechanical mills have been hailed as an integral part of technological evolution and one of the main reasons for the modern prosperity of mankind. The idea that 'medieval waterpower technology in large part laid the foundations for the late eighteenth-century industrialization' belongs to this latter type of viewpoint (Basalla 1988, p. 147). Either way, the underlying message in both statements is clear: for better or worse, technological innovations change society. This intertwined development of society and the advances made in the technological resources humans make use of is indeed recognisable in the case of the watermill.

The effect of the watermill

As early as 1935, Marc Bloch described the social history of the watermill, in which he related the development of a particular technology to another development at the social level (Bloch 1935 [1967]). Bloch highlighted the relationship between the increasing centralisation and control of production, and at the same time a decrease in the dependency on traditional animal or human sources of power, leading to a freeing of production. Bloch believed that the reason behind this development could be identified by the introduction of the watermill. Most importantly, Bloch also pointed out that the technological development of the watermill was not an autonomous historical development, but needed to be understood in relation to the general social negotiations and changes taking place in the period in question.

In addition, Lewis Mumford's (1934) publication *Technics and civilization* suggests that the medieval watermill was extremely vital to the later prosperity of Western society. The more dominant hypothesis in Mumford's research was that a long development towards an industrialised society in the 19th century should be regarded as the most plausible scenario. The point of origin was therefore identified in the medieval period and specifically so to the monastic communities. Unlike in earlier periods and societies, the medieval monasteries, with their strict order, discipline and tradition of practical, as well as theoretical, education, promoted a change of mentality which in turn led to a cultural climate that encouraged mechanisation and industrialisation. Mumford therefore introduces the idea of particular religious communities providing the foundation for social progress. In essence, despite their different line of argument, both Mumford and Bloch advocated the idea of a medieval industrial revolution, based on the introduction of water-powered tools and new types of manufacturing processes. At the hub of this process was the watermill, which provided an almost never-ending supply of power.

In the wake of their research, there arose a general agreement that not only did the historical and material record represent a medieval revolution, but also to a great extent that this revolution was generated by the spreading of monastic communities across Western Europe. Furthermore, it was believed that this type of watermill production and its different applications (fulling, hammering, sawing, etc.) was based on the inventiveness of the monks, and that they therefore were the main protagonists behind the industrial revolution of the Middle Ages and later on (Carus-Wilson 1941, Reynolds 1983). For these reasons, it was argued that Christendom possessed an intrinsic mechanism of ingenuity and technical fertility upon which Western society was founded (White 1969). However, recent research has begun to question both the monastic and the geographical origins of the watermill. Let us therefore take a closer look at the most recent information concerning the spread of the use of the watermill.

The technological origin of mills

One of the earliest descriptions of a watermill is made by the Roman master builder Vitruvius in his major work de *Architectura* of around 25 BC (see Figure 1). His description is evident of a rather elaborate type of watermill, which is equipped with gearing and a vertical wheel (see Rowland and Howe 1999, p. 124 for a translation of the original text).

Furthermore, Vitruvius portrays the watermill as a new invention and an uncommon phenomenon. It has therefore been speculated that the invention of

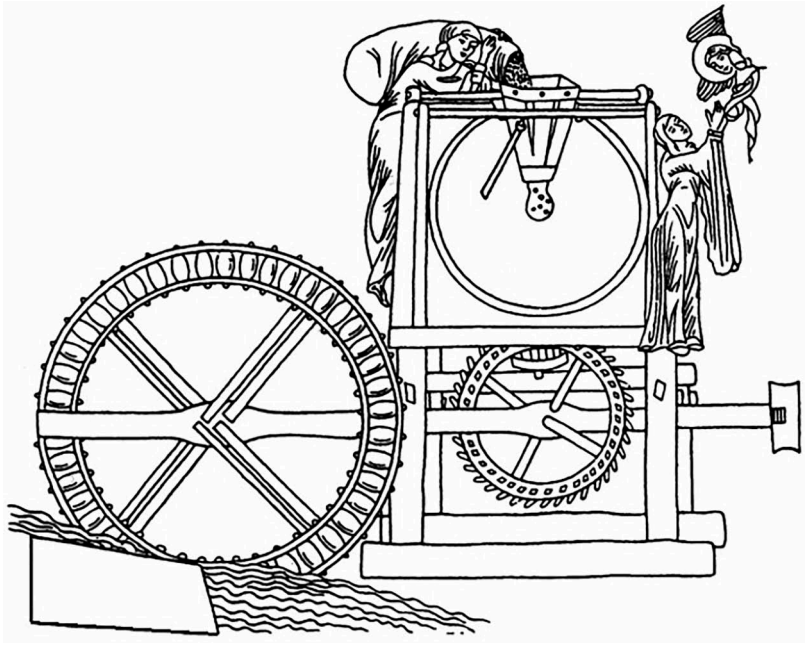

Figure 1. One of the more complete illustrations of a geared watermill is found in Abbess Herrad von Landsberg's 'Hortus Deliciarum' (c. 1170). The design is virtually the same as that described by Vitruvius 1200 years earlier, attesting to the very well thought out Roman construction. Divine intervention in the building of intricate machinery is regularly expressed in hagiographic writings, and in the Landsberg illustration, such a relation can also be found with the miller's wife (?) showing gratitude to a celestial being.

the watermill belonged to the 1st century BC. However, the most recent research, particularly by Örjan Wikander (2000, 2008), Michael Lewis (1997) and Adam Lucas (2006), indicates that watermilling was invented in Alexandria during the 3rd century BC, a century characterised by a general flourishing of experimentation and appetite for invention. The archaeological evidence for watermills from the Roman Empire is abundant, as well as widespread, and the material and the written records agree with one another. For example, a very well-preserved example has been found at the Zugmantel fortress (see Figure 2), east of Cologne, which used the power of the Rhine (Jacobi 1912, Spain 1987, p. 341). This watermill is of a very comparable type to the one described by Vitruvius and has been dated to before AD 300,[2] and two similar constructions from Kanton Zug, Switzerland (Speck 1961) and München-Perlach, Germany (Volpert 1997) can also be dated to the 2. and 3. Cent. AD.

In addition, from the northernmost regions of the Roman Empire, the very recently excavated Romano-British watermill at Cockermouth, Cumbria (see also Wikander 1980, p. 29–30 concerning the Haltwhistle watermill on Hadrian's Wall) bears witness to the widespread use of watermills following the expansion of the Roman Empire (Graham 2010). As far as the archaeological record indicates, it seems as if every part of the Roman Empire must have been knowledgeable about the use of watermill technology. The idea of the medieval technological revolution seems therefore to have been exaggerated and even in areas outside the Roman Empire watermills have been recorded predating the traditional medieval period (see below).

In terms of material composition and function, what these types of buildings represent is a technological innovation which is based on specialised craftsmen – builders as well as operators. More precisely, the introduction of the watermill in South Scandinavia has to be viewed as a link in the chain of continuous specialisation characterising the Late Iron Age and the following centuries. In the archaeological record, this process is particularly recognisable as more and more buildings have an increasingly unique architecture (Jessen 2012). This is due to the specific single-function status of the buildings, such as stables, smithies, temples and other specialised areas. Prior to this several functions could be carried out under the same roof and

Figure 2. The excavation at the Roman fort at Zugmantel revealed several parts from a watermill. One of the more obvious parts was this complete lantern-type pinion with six staves and still attached to its millstone spindle, which must have belonged to a geared vertical waterwheel located on the frontier of the Roman Empire. As these parts are dated to the second half of the 2nd century, the diffusion of the watermill technology must, accordingly, have taken place quite soon after the invention of this elaborate machinery. (After Jacobi 1912).

apparently also performed by the same personnel. But also the watermill was previously believed to consist of two different types, which led to the idea that it also might have involved two different use models.

Different types, different use?

Regarding the technological refinement of the watermill itself, a consensus has long existed that there was a gradual development from the smaller horizontal models to the larger vertical wheel type. It can be argued that the horizontal wheel is of a simpler construction because the power transfer runs directly from the hub of the waterwheel to the tool intended to be driven, usually a grinding stone, and the only difficult component to manufacture is the big stub holding the blades (Rynne 1989, p. 23). The vertical wheel is more complicated as this needs some sort of transmission in order to function properly, such as a spindle pinion driven by a toothed drum. This latter construction entails a more intricate design and more parts have to be assembled, and knowledge about how gearings works is imperative; thus, a logical conclusion would be that the simpler horizontal wheel mill would have been a forerunner of the vertical wheel. However, the problem is that such a chain of development cannot be recognised for the original and early advancement of milling technology as it is recorded for the Levant: in this area, the simpler vertical wheel might have been developed as a response to particular environmental needs (Wikander 1980, p. 104ff.). Therefore, as argued by Fischer (Fischer 2004, p. 30–31), there are no decisive reasons supporting this developmental distinction, because several other factors might lie behind the construction of the different types of watermills. For example, the social framework surrounding the early watermills in South Scandinavia, which were closely connected to the upper echelons of society, such as the clergy and aristocratic levels, would generally favour bigger and more efficient types of mills, such as the vertical wheel version. In other words, because the watermills in Southern Scandinavia were introduced during a time of increasingly centralised systems of production, the smaller farmstead-sized horizontal watermills were not efficient enough to handle the amount of grain to be processed, thus making the vertical water wheel the more preferred version. Also the emerging towns and cities would generate a bias towards constructing bigger mills as the need to serve larger proportions of the population in a limited area grew.

A hitherto disregarded factor would also be the different environmental settings into which the mills were placed. One of the challenges with installing a horizontal wheel and making sure it has a longer service life is to avoid the undermining of the wheel. As these types of mills mostly operate using fast-running streams of water (i.e. under high pressure), this also potentially generates severe erosion if the ground underneath does not consist of a durable material like hard rock. Apparently, the distribution of the horizontal mills is closely connected to areas

where the bedrock frequently surfaces, such as Northern Scandinavia, Scotland, Ireland and the Danish island of Bornholm. Using a horizontal water wheel is no great problem in such areas. In the rest of South Scandinavia, however, which is completely dominated by sand and moraine deposits, such a construction as the horizontal wheel, will quickly be undermined and thus become dysfunctional and demand a considerably higher level of maintenance, or further modifications of the immediate environment such as sett-laying under the wheel. Furthermore, it can even be questioned whether the type of streams accessible in South Scandinavia can even muster the required flow to actually drive a horizontal wheel altogether. The vertical wheel, on the other hand, is mainly driven by a combination of the pressure of the water and the angle of the blades on the wheel (i.e. momentum), which can be provided by a much slower running waters. Such a solution is very much suited to the bigger rivers and streams of the South Scandinavian lowlands. Also, such an influx of energy can easily be managed by the construction of wheel casings around undershot vertical wheels. These types of construction have been found archaeologically at several places in South Scandinavia, which are characterised by vertical wheel watermills. No essential components, such as the robust paddle stub, suggesting the presence of horizontal watermills have so far been recorded in the South Scandinavian lowlands. In conclusion, the vertical-wheeled watermill must have been the preferred type of mill to be constructed in South Scandinavia – both with regard to the social framework and the environmental setting.

Furthermore, as the earliest dated finds of watermills in the South Scandinavian lowlands testify, there can be no doubt that the first types of wheels were of the vertical type (Linde-Laursen 1989, Fischer 2004, p. 107; Andersen 2011, p. 28f.). The very early finds from Ljørring (^{14}C date of 767–1220 AD cal.,[3] average AD 990) and Omgaard (after AD 917, dendrochronological date) included diagnostic types of paddle blades (see Figure 4), which would have been attached to a vertical wheel (Eriksen *et al.* 2009, p. 79ff.). The Ljørring watermill was long believed to be of the horizontal type (Steensberg 1959) due to the excavations of a similar mill at the Irish Mofett site (Lucas 1953). Both have, however, been reinterpreted as of the vertical type (Rynne 1989, p. 24–5, Fischer 2004, p. 84ff.). In fact, there have been no definitive finds, epigraphically or archaeologically, of horizontal wheels dating to before the 7th century AD, making this type a rather late invention (Wikander 2000, p. 376). When the absence of machine parts from horizontal wheels at the several excavations undertaken at watermill locations in South Scandinavia also is taken into account, there is no longer any proof of the use of the horizontal type of watermill in early medieval is this area.

Social consequences of watermill technology

The opportunities presented by the watermills and the new type of energy source were obviously taken very seriously and figured prominently in the management of the medieval state. The proclamation made in the 14th century by the Danish King Valdemar IV Atterdag that *The streams should not run to the beach without first having served the country*[4] bears witness to the central position occupied by this particular energy supply.

Depending on which level of the overall social hierarchy one was on, such milling machines also presented different political opportunities, because they could be exploited as a means of taxation. This resulted from the 'suit of mill' principle, in which a group of people were obliged to use particular mills, which were under the management of the king, aristocracy or the Church, and in turn pay a toll to the owners (Madsen 1986, Carelli and Kresten 1997). It was a principle that ensured a steady and tidy profit for the privileged class to whom the suit of mill was granted. The consequence was that the continuously increasing legal bonding between peasant and mills, due to the various suit of mill legislations, directly resulted in a system of taxation, as by governmental means the upper strata of society could dictate where the farmers had to get their grain milled. Preferably, this should be done at the king's, the Church's or the aristocracy's own mills, thus providing them with the attractive revenue this would give. Peasants had to pay a fee known as multure to get their grain processed. For this reason, it is clear that the mills became a political instrument for two main reasons. Firstly, the technology itself forms part of the power relations

defined in early medieval society, and it is quite clear that 'the powers that be' are quick to exploit the new technology. Secondly, the people to whom the innovative technology is turned against as a means of control presumably regard the milling machine as a deviation from customary law and traditional rights. Consequently, in the case of the watermill, this combination of technological innovation and social negotiation results in a new form of dependency, through the use of force and monopolisation of the new technology, and leads to a manorial-type system of taxation.

In the case of the watermill, this conflict between the different strata of society took a very concrete material manifestation, because in certain areas and in order to maintain the legislative privileges, private querns were banned and then collected with the purpose of preserving the privileges of the major landowners.

At the monastery of St. Alban in Gloucestershire, this resulted in a century-long dispute between the monks and the local peasants, culminating in The Peasant's Revolt in 1381. Unlike at the urban centres such as Newcastle, Cardiff and Tewkesbury, the monks of the monastery of St Alban refused to grant the citizens any concessions in relation to the mills administered by the monastery (Lucas 2006, p. 166). The conflict entailed a series of legal acts, and in 1331, the Abbot was granted the right to confiscate all querns, hand-driven and otherwise, on the property of the monastery, in order to enforce the monastery's suit of mill. The local quernstones were then collected, broken and re-used in the floor of the Sacristy of the monastery, in order to emphasise its privilege. During the revolt, this pavement was dug up and the broken querns were carried home by the peasants as tokens of victory and freedom (Wagner 2002, p. 219).

The environment of the milling machine

It is important to bear in mind that watermills not only involved combining intricate machinery, such as the waterwheel, gearing and grinding stones, but also meant alteration and adaptation of the environment in the vicinity of the building. Watermills are heavily dependent on location and on suitable types of water supply, and natural watercourses, as they flow through the landscape, are rarely sufficient to provide an adequate power supply to push and run the wheel. Sluices, dams, penstocks and building platforms regularly accompany the buildings in order to manage the flow of water, as well as the amount of water sent to the wheel. The impact of milling on the immediate environment can be quite significant and completely change the natural flow of water, in particular just before the mill or just after it. In a similar vein, the construction of dams and weirs to further enhance the control of the flow of water also entails quite elaborate earthworks, which involve additional alteration of the natural environment.

This is also the reason why a great deal of legal effort is put into determining who is allowed to use the stream and to what extent. From the Middle Ages and after, there would have been a change in the environmental setting downstream from a watermill, as well as a different supply of water and flooding of low-lying areas. This is also the reason why the legislative side of milling provides a couple of interesting points in the South Scandinavian area. For instance, there are the general outlines presented in the Law of Jutland book 1, chapter 57, stating that individuals are not allowed to build a mill unless they possess right of use to the stream and that the dam or lake around the mill does not interrupt the further use of the water for other persons downstream. This is further developed in the Law of Denmark book 5, chapter 1 (of AD 1683), where it is made illegal to build new mills, unless it is done at a location where a mill was formerly located. Presumably this would strengthen and consolidate the different suits of mill and make it easier to monitor the processing of grain. Equally, making it illegal to have a private mill within a mile of the privileged mills would encourage the same effect (book 5, chapter 4).

Until the end of the 17th century, it can therefore be assumed that there were several smaller mills, which presumably only served a handful of farmsteads. These were eventually banned by law. The first common Danish law of 1683, during the reign of Christian V, contains a chapter 'Concerning Mills and Water', in which it is stated that mills placed less than a mile from a mill paying tax should be removed. The same rule applied to windmills. Furthermore, it is stated that the peasants under the king's jurisdiction are bound by certain milling

obligations. This meant that a peasant tenant of one of the king's farms was obliged to have his grain milled at one of the king's own mills. The milling obligation had already been commanded by royal decree in 1617.

Legal tracts and watermills

In tandem with the diffusion of the technology, the legal programme also adapted to the effects of the watermill. Because watermills have quite an impact upon their immediate surroundings, regulations concerning how much environmental disturbance to be tolerated figure prominently in the law codes. The texts themselves therefore often targeted the smaller private mills, as they were difficult to control for the central administration.

A great deal of the confusion surrounding the identification of the earliest types of watermills also seems to originate from etymological misreading of the written records from the period. In particular, the word 'skvatmølle', which frequently appears in the written records, has mistakenly been taken to exclusively denote a horizontally wheeled mill. However, the research of ethnologist Anders Linde-Laursen (1989) has clearly shown that 'skvatmølle' does not relate to any specific type of mill (the word can even refer to windmills), but instead points towards the size of the mill, as well as its context. 'Skvatmøller' are therefore to be understood as smaller mills, which are mainly privately owned and usually belong to a single farm or just a few farmsteads. For these reasons, the previous tendency to equate 'skvatmøller' with horizontal wheels is therefore erroneous (Steensberg 1959). It is, as previously mentioned, unlikely that watermills with horizontal wheels would have had any significant distribution in Southern Scandinavia, as they cannot function sufficiently well in sandy or clayish subsoil, due to rapid undermining of the wheel.

With regard to the practices advocated in the legislation there is, however, clear evidence in the written sources that different types of suits of mill were used prior to the general legal definitions mentioned above. In a Royal letter as early as 1175, describing the exchange of property between the monastery of St Knud in Odense and King Valdemar the Great, we recognise the granting of milling privileges. In the latter, the king grants the monastery a plot of land and at the same time instructs the citizens of Odense to use the mill of the monastery to process their grain. This letter provides evidence of two things. Firstly, there must have been a mill in Odense before 1175 and, secondly, that at this point in time suits of mill had already been introduced at certain locations in the country. Perhaps such privileges were already held by the King (Madsen 1986), and in the British Isles, such privileges seem to have been in operation as early as the 9th century and a similar situation appears to have prevailed on the continent, in France in particular (Lucas 2006, p. 167ff.).

The practice of collecting the local and private means of milling, such as the rotary hand querns (see the monastery of St Alban example above), is of course difficult to identify through excavations. However, there are a few indications that such a practice was carried out in connection with mills. This also applies to mills of early origin. In his description of the watermill at Tovstrup, and apparently also at the nearby Humle Mølle, Christian Fischer mentions a conspicuously large amount of quernstone fragments within the premises of the watermill. The excavator interprets this as a possible indication of deliberate collection of the local and private quernstone in order to make sure all grain was milled at the watermill (Fischer 1984, p. 8). This phenomenon indicates that milling obligations might have applied to the mill at Tovstrup and that the proprietor actually had the power to collect the private equipment, thus maintaining his own privileges. The dating of the Tovstrup mill to the middle of the 12th century corresponds with the written evidence from Odense.

The reason for examining the significant alterations in the area around the mill is because they are often the starting point for archaeological excavations, as these larger structures may still be visible on the modern-day surface. Together with other robust materials, such as grinding stones, which are often found in connection with the watermills, they constitute the most frequent finds. I will therefore turn to the excavation of the Late Viking Age settlement at Omgaard, Western Jutland, where several of the previously mentioned watermill indicators have been registered.

Milling and the Viking Age settlement at Omgaard

The excavations at Omgaard have not been straightforward. To begin with, Omgaard was one of the high-profile research excavations of the National Museum in the early 1980s, but eventually became the life's work of a single person, the excavator Leif Christian Nielsen. Unfortunately he died at a young age, leaving behind a great deal of interesting finds and complicated plans, but without having finished a more complete work on the site (Nielsen 1987). This challenge was taken up in 2007–2009 as a joint venture by the local Ringkøbing-Skjern Museum and the University of Aarhus (see Figure 3). A lot of the records from the original excavations are hard to decipher, and the finds material and house plans, for example, can be difficult to come to grips with. For these reasons, the current and preliminary research results of the Omgaard settlement should be regarded as work in progress.

The Omgaard watermill

Amongst the major finds from Omgaard are several fundamental parts of a watermill. They were found preserved in the wetland areas around the Pøl Bæk, and mainly the southern bank, which forms the northern border of the settlement. Seemingly there was at least one watermill at this location, and possibly a series of watermills, perhaps even in continuous used for a period of up to 500 years.

Figure 3. Omgaard is a Viking Age settlement (c. 700–1050 AD) consisting of three farming parcels and a series of long houses within each parcel. The northern border of the settlement is outlined by the Pøl brook, and it is in this stream that the different watermill parts have been excavated.

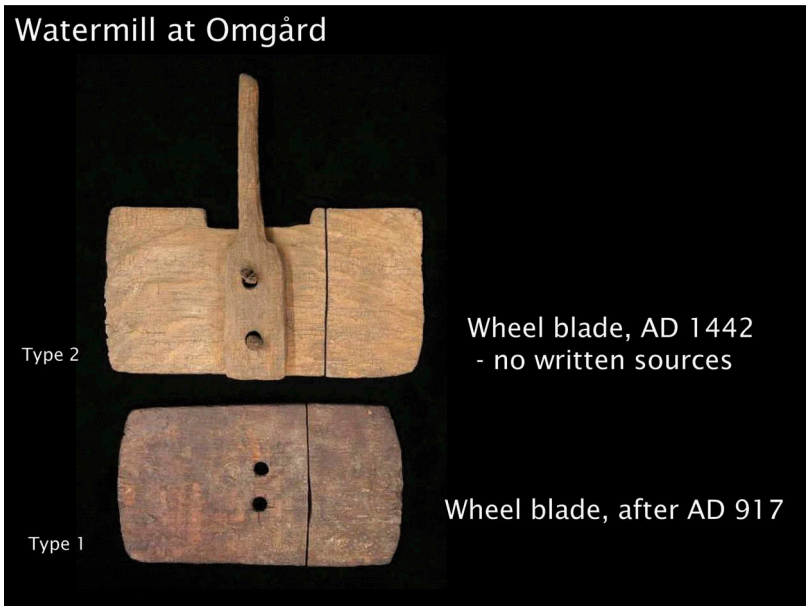

Figure 4. The blades have been dated at the National Museum of Denmark using tree-ring dating. As with numerous other early mills, there is no historical record available to verify the age of the mill and only scientific evaluation and measurement of the finds can be used to date the Omgaard mill (Photo courtesy of Torben Egeberg, ArkVest).

The more significant finds are two blades from a waterwheel (see Figure 4). They are of different types, but are both made of oak and originate from a single-ringed waterwheel, which is the earliest type of vertical waterwheel that has been recorded in southern Scandinavia. Type 1 is the simplest type and consists of a flat blade, with a central anchoring in the middle of the blade made with a small peg, by which it was fastened directly onto the waterwheel.

Type 2 is a slightly later type, which also features the central anchoring, but has an additional fastening where the blade itself gripped the waterwheel or a mortise was fixed directly into the wood of the wheel.

With regard to the dating of the wood, the Type 1 blade is of course the more interesting piece due to the very early date of AD 917 or after. However, some reservation is necessary with regard to the dating, due to the fact that the tree-ring date of the oldest blade is a *terminus post quem*, which only indicates the earliest possible dating of the wood. As we are dealing with oak, the date of the actual felling of the tree could be considerably later – 100 or 200 years – because the outer growth layers could have been chopped away in the process of constructing the blade. However, according to the dendrochronologist (Niels Bonde, pers. comm.), the builders of watermills would have been highly skilled craftsmen, as such machines are complicated to build. When making these types of blades, the woodworkers would avoid chopping off too much wood from the oak log in order to make the blades in the most economical way, thus only chopping away the outer sapwood of the log and the inner core. Therefore, a dating of the use phase of the Type 1 blade to around AD 1000 would be the more plausible interpretation. In any case, even a very conservative date 200 years after the last measurable growth ring would still make the Omgaard watermill one of the oldest excavated watermills.

Waterwheel casing

In addition, the find of a sluice beam indicates the presence of a watermill. This wooden log apparently functioned as part of the casing of the waterwheel and controlled the flow of water into the wheel. It should be mentioned that the finds from Omgaard and the context of the mill have been dismissed in the latest overview of South Scandinavian watermills made by Christian Fischer (2004, see also Andersen 2011, for a similar conclusion), mainly due to the dismissal of the casing for the wheel, on the basis that the sluice was actually a doorstep. However, by comparison with the existing examples of excavated wheel casings, it seems evident that the plank may

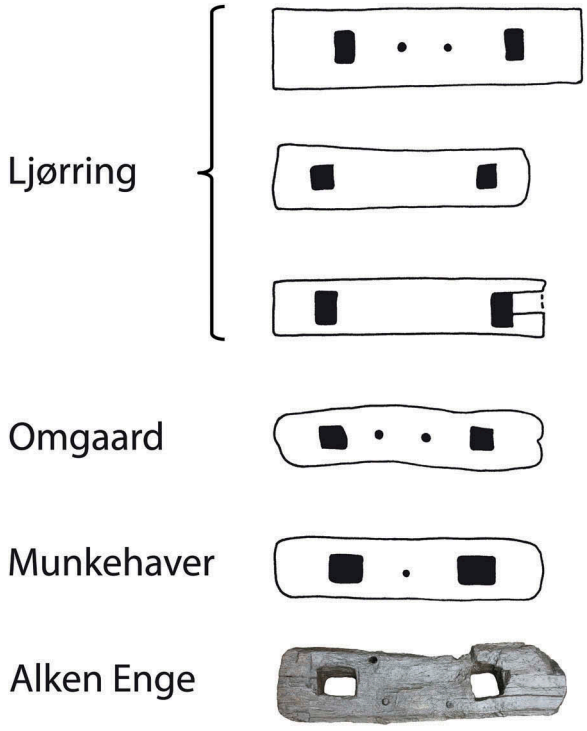

Figure 5. When comparing the beams from Ljørring and Omgaard, which are chronologically and geographically close to one another, the similarities in design are evident. They share the same patterning of big and small holes, as well as dimensions. The single find of sluice beams from Munkehaver (C14-dated to 655–690 e.kr. (AAR-5478), see (Eriksen and Olesen 2000, p. 171ff.) and Alken Enge (dating pending) also underline the morphological similarities as well as early dating. For these reasons, it is valid to identify the Omgaard plank as part of the sluice from a waterwheel casing (After Eriksen *et al.* 2009, fig. 5.17 and photo by Ejvind Hertz, Museum Skanderborg, Alken Enge Project).

easily originate from a wood-built casing controlling the stream of water to the wheel. Secondly, it seems highly unlikely that worn-out parts of a dismantled mill would have been carried across land and dumped in Pøl Bæk. These parts must stem from a watermill located somewhere along Pøl Bæk, and in particular, the find spot of the sluice beam would indicate the actual site of the watermill (see Figure 5).

This interpretation is further supported by the road construction crossing Pøl bæk around 100 m further downstream (Nielsen 1987, p. 184ff.). This is the location where the stream would widen as a result of the functioning of the wheel and dams, and presumably some kind of road construction was needed in order to cross the stream this close to the mill. Hence, the watermill must have been located somewhere along the bank of Pøl Bæk, where the Omgaard settlement has also been registered.

What is particularly interesting in the case of Omgaard is that firstly we are dealing with one of the earliest watermills in Denmark, and secondly we also have the fortunate situation where it can actually be related to a settlement of the same period. There is therefore a unique opportunity to observe what type of rural environment such an early watermill would have been related to, as well as the social changes this new technology might have brought with it.

Grinding stones and social changes

As we have been informed by the historical sources, the introduction of the watermill technology might have influenced, or even dictated, the way the milling of grain was carried out in the vicinity of such an apparatus. Certain privileges usually accompanied the construction of the watermills and different suits of mill might have affected the distribution of milling equipment in the local environment. In order to evaluate the effect of the introduction of the watermill and associated regulations, I will examine the correspondence between the frequency of quernstone fragments at the Omgaard settlement, their dating and the possible introduction of the watermill at this location.

If we follow the idea in the medieval legislation, we might expect that the construction of a watermill in a settlement such as Omgaard would change the way the individual farmsteads handled their grain and the milling of it.

With regard to the 'materiality of milling', the presence of small hand-powered and private grinding equipment would perhaps vanish with the introduction of a watermill. Private flour production was made superfluous or perhaps even illegal; thus, the private querns would presumably vanish from the finds record, or at least change in composition.

Another characteristic of the development of milling is the introduction of new types of grinding stones. The first new type to be used in South Scandinavia, besides the traditional local granite, was volcanic basalt – the Mayen lava. This type of stone is mostly mined in the western part of present-day Germany, more specifically in the Eifel region, and was presumably introduced as the main type of grinding stone for rotary hand querns

as part of the Romanisation of Southern Europe. From the latter area, the grinding stones then spread to the north via the traditional trading routes. This is also the reason why these stones are found as commercial items at the major trading centres of Hedeby and Ribe (Schön 1995, Parkhouse 1997, Feveile and Jensen 2000, Feveile 2010). It would be a reasonable interpretation to assume that the Omgaard settlement obtained its stones from these localities or comparable trading centres.

A slightly later type of imported grinding stone is represented by the mica schist, which often originates from a more local source, namely the Norwegian mountains and in particular the Hyllestad quarry (Baug and Løland 2011). The Norwegian stone is presumably imported from the mid-10th century onwards and occasionally in connection with mechanised types of milling, such as the watermill (Carelli and Kresten 1997, Jørgensen 1998).

Both these types of stones have a naturally rough surface, but the grains do not detach easily, and therefore, the material being ground does not become gritty. Using these rocks makes it possible to use larger types of millstones, which do not need to be re-cut frequently for improved grinding capacity. These types of stones are therefore ideal for mechanised grinding. From a chronological point of view, these two types of grinding stones also provide an indirect means of dating as they, or at least the schist, have a rather well-established date of introduction.

For these reasons, the Omgaard finds catalogue have been examined in order to determine what kind of grinding tools were excavated at the settlement and from where they originated (see Table 1).

The distribution of the different types of grinding stones is not surprising but there are a couple of points that should still be mentioned. Firstly, there are conspicuous quantities of volcanic basalt, and where the provenance can be registered to a building, they can be connected to House II at the settlement. This house is interesting because it belongs to the only farmstead without access to the nearby waterway, which may indicate that this household made a different choice in terms of grain milling, whilst the two northern farmsteads made use of the mill and the watercourse (see Figure 6). Secondly, as the architectural features of the house can be compared with the Sædding-type houses, we must expect that this particular house was not present after AD 950 (Stoumann 1980, Skov 1994). The dating of the house therefore indicates that the use of the house, and therefore also the use of the basalt quernstones, predates the introduction of the mill.

The question is therefore why the use of rotary hand querns, to which the basalt fragments presumably belong, did not continue on a more regular basis after the Sædding-type house had gone out of fashion. As these types of rock are not indigenous to the area, they are easily recognisable and it is not likely that they would have been overlooked during excavation. As the granite fragments may be from an older settlement, we seemingly face a situation where we actually have no quernstones from a defined context that can be related to the younger phases of the settlement. Even though the rotary basalt quern was a more efficient tool compared to the earlier saddle-type querns, they seemingly only had a very limited use phase at the Omgaard settlement. This absence in the latest part of the settlement coupled with the fact that mica schist is virtually absent might be related to the fact that the mill was introduced at a point at which a general transition in milling strategy was taking place at Omgaard. At the time when the mill was introduced into the settlement organisation, presumably sometime around the year AD 1000, private grinding equipment might have become superfluous and hand grain milling was replaced by a different initiative – the watermill. A possible interpretation would therefore be that around the turn of the first millennium the settlement at Omgaard had a centralised milling organisation, in which the mill functioned as the dominant source of grain processing. In support of this interpretation is the fact that the only complete quernstone was seemingly found in the water raceways (find location unclear), and the excavator interprets this stone as having been used in the watermill (Nielsen 1987, p. 187 + 194f.). However, as the thorough research made by

Table 1. The quantities of quernstone fragments from the Omgaard settlement. The position of Omgaard is worth noticing as it is placed very close to the northernmost distributions of the Mayen lava imported from the Eifel area (see Carelli and Kresten 1997, fig. 18). However, neither the slightly later Norwegian schist nor the basalt fragments have been registered in any context dated after approx. AD 1000.

Quernstone and fragments	Number	Comments
Granite (local)	15 fragments	2 in pavements and 2 complete
Basalt (early import)	39 fragments	context House II, none with striation
Schist (late import)	1 fragments	From Oven II, after AD 950

Figure 6. House II is the main building in one of the phases of the southernmost land parcel. This particular plot did not have access to the stream, but the construction of the water-powered mill apparently still resulted in an end to the use of basalt quernstones.

Carelli and Kresten (1997) shows, the diameter of ca. 42 cm on the Omgaard quern places it significantly under the standard of proven watermill querns having a diameter above 70 cm (Carelli and Kresten 1997, p. 118). The registration of a quernstone intended for hand use in the vicinity of the watermill certainly bears resemblances to confiscation of quernstones (as the Tovstrup case mentioned above), in order to promote a soke of mill and install privileges to exclusive groups. In any case, whether the operation of the mill was organised from one of the three farming parcels or from an external power is difficult to clarify, but the consequence of constructing the mill nevertheless seems to have been a centralised grain processing taking place at the watermill. The find at Omgaard being very early does, however, open up for the interpretation of the complete quern being used in the mill; it would not seem unlike that the initial watermills would mix the new technological knowledge with traditional equipment already in use, thus incorporating a 'small' quern in a new mill. Conclusively, the interpretation of the find of a complete (gneiss)quern points in different directions, but with the common denominator of phasing out the private processing of grain.

Related influences of technological and social change

Relating the development at Omgaard to the early medieval societal changes necessitates a look at the general development of the watermill in South Scandinavia. In particular, two aspects of development which originate in two separate, but related, spheres are of relevance to the local development at Omgaard. The first is the introduction of a new type of milling technology, resulting in the spread of watermills in Southern Scandinavia. The second is the implementation of certain privileges, known as suit of mill or soke of mill, which apparently followed quite rapidly after the introduction of centralised grain milling.

Regarding the first threshold, the development of the watermills into a widely used type of technology has traditionally been associated with the introduction of the monastic communities, and particularly the Cistercian Order, as they were founded in South Scandinavia during the middle of the 12th century. However, as has been demonstrated in particular by the work of Anna Götlind (1993, see also Sterum 2010), the role of the Cistercians in the introduction of various technological innovations has been exaggerated and lacks empirical support. The Cistercian Order was obviously very well informed about the most recent technological innovations and quickly incorporated new ideas into their own constructions. However, the notion of the Cistercians as the main agents behind the technological development of the Middle Ages per se seems to be an overstatement. Other institutions would have had a significant influence upon the diffusion of new technologies. For example, secular groups, such as the military,

merchants and the entire agricultural community, would likewise have influenced how new technologies were introduced into South Scandinavia (Sawyer 1987). Already in 1133, the Archbishop Asser, purchased a manor in Värpinge in Scania, Sweden, thereafter donating the entire manor, complete with at mill, to the cathedral in Lund. It is clear that the former owner was a local magnate and therefore also a layman (Hybel and Poulsen 2007, p. 203–4). Conclusively, and contrary to the ideas of Fischer (2004, p. 26 ff.), the spreading of the Cistercian order should perhaps be associated with a more effective dissemination of the watermill technology into South Scandinavia, but evidently not regarded as an initial point of origin.

Combined with the early dating of the watermills from Omgaard, Ljørring, Tovstrup and others, which predate the Cistercians settling in South Scandinavia, the argument stressing the importance of the monks' technological role cannot be sustained any longer (see Figure 7). The technological knowledge of constructing and operating the mills came from elsewhere and earlier on. As is the case with any type of diffusion and spreading of knowledge, the precise process of development is virtually impossible to trace and in many cases has a complex

Figure 7. Distribution of watermills dating to before 1150 AD. Only numerals = excavated sites, with question marks = written evidence. 1: Omgård, 2: Ljørring, 3: Munkehaver, 4: Galten, 5: Tovstrup, 6: Kalbygårds Eng, 7: Løgumkloster, 8: Kirke Værløse, 9: Nymølle, 10: Borup, 11: Varde, 12: Odense, 13: Næstved, 14: Roskilde, 15: Värpinge, 16: Vittskövle (Based on Carelli and Kresten 1997, Fischer 2004, Eriksen *et al.* 2009; and recent excavations).

and multifaceted history. Furthermore, the very early mills just mentioned can at no point in time be connected to monasteries, and they were therefore not part of the clerical sphere of technological diffusion.

With regard to the second threshold, which effectively presents a development from a centralised to a regulated type of organisation, an obvious socio-judicial reason lies behind this process (as mentioned above). Therefore, the legislative development of the various types of privileges and decrees accompanying the watermills is part of a secondary progression in the general mode of watermill diffusion. Seemingly, the technology was present already and it provided a clear opportunity for the dominant groups in society to expand and consolidate their powerbase. The technology was not initially introduced as a means to administer the production, but was nevertheless quickly incorporated into the manorial-type organisation of the settlement structure and the general institutionalisation taking place after AD 1000. This necessitated a clear demarcation of the privileges which the proprietors sought. Such a demarcation could only be maintained if it became a verified legislative act. As the technology itself provided the possibility of introducing a system of supervision and taxation, the legislation regarding the different kinds of suits of mill could be introduced. It was, however, not the introduction of the watermill which generated legal privileges. These were rather the result of the process of centralisation, combined with a growing hierarchisation and institutionalisation of the South Scandinavian society in the Early Middle Ages.

Why did the introduction of the watermill take place then, if it was not because of its introduction by a group of people already knowledgeable about the benefits of waterpower, such as the Cistercians? Perhaps a general change in the attitude towards technological investments might be a basic premise for the widespread introduction.

Also, turning the question around, what type of society rested on a cultural platform and a certain type of mentality in which it became both fashionable and acceptable to benefit from technological innovations? Apparently, there was no extensive tradition in prehistoric South Scandinavia of investment in technological improvements. Landholders were more likely to save their money, or invest in conventional items, rather than speculate upon

Table 2. General development of milling in South Scandinavia which illustrates how the social, economic and technological spheres are interconnected. Two thresholds are especially important to the present study. Firstly, there is the introduction of the watermill, because it represents the final and most profound change in a series of advances in milling technology that took place in the Viking Age, and presumably close to the end of the 10th century. This change takes place mainly in the technological sphere and can be regarded as the most profound upgrading of the ways grain is being processed. The second threshold is the introduction of the legislative privileges given to certain social groups during the Middle Ages, and positively taking place from the middle of the 12th century and onwards. Neither of the two thresholds derives directly from the economic sphere, but nevertheless causes changes in the financial organisation, thus testifying to the hybrid character of societal development of taxation. The fourth level is a rather special Danish constellation where the late 19th centuries witnessed an enormous upsurge in a co-operative movement (Andelsbevægelsen) where individual, small-scale farmers in solidarity supported each other by investing collectively in expensive production machinery such as mills or dairies.

Development of Milling	Social	Economical	Technological
First Level	Private	Household	Local ↓ *Upgrading 7-10th century*
Second Level	Centralised ↓ *Privileges 12th century*	Surplus Trade	Imported
Third Level	Regulated	Proto-Industrial	Imported
Fourth Level	Co-operative	Industrial	Transnational
Fifth Level	Private	Capitalistic	Global

untried technologies. Furthermore, such mills required a considerable amount of investment, in particular for the more elaborate constructions, such as the vertical watermill.[5] Watermills involved a reduction in labour investment, and perhaps more importantly, the mills could be turned into a source of additional profits. Thus, they provided a perfect solution to the increasing demands of trade and marked the initial steps towards a capitalistic spirit and private enterprise taking place around AD 1100 (Carelli 2001). The legislative outcome expressed in the different types of suits of mill, in which the king, the Church and the aristocracy exercised their privileges over the people working the land, follows the same line of argument. As these institutions grew in power and property, an easy way to progress further was to take advantage of technological developments and to compel people to use particular grain mills and pay in kind for their use. Such privileges would also result in a rather steady type of economic platform. In this way, the new technology stimulated new social relations.

However, it is important to note that the presence of the watermill did not cause the introduction of taxation, and evidently taxation could be administered by other means (see Table 2). Nevertheless, taxation based on centralised milling and a privileged class (a production-dependent type of taxation) was made much easier by the technological advances afforded by the introduction of the watermill itself. Therefore, the actual physical tool that the watermill represents, and which we as archaeologists under fortunate circumstances can record, provided the dominant class with a concrete platform for social negotiation. In effect, the watermill improved and eased the introduction of a centralised system of taxation.

The history of the watermill has shown us that the actual technology did not change considerably over almost two millennia of use, and with only minor alterations the Vitruvius-type mill has been registered from antiquity until the Industrial Revolution. Nevertheless, the actual societal formations, which were generated around the use of this particular type of technology, were considerably more dynamic phenomena. Clearly, a deep interaction and dynamism existed between the development of society and the development of technology. It is therefore crucial that these two dynamic factors are regarded as having a related historical course of development. On the one hand, we recognise a physical structure – the mill – as a tangible, but normative parameter, which facilitates and administers the social structure through its sheer physical presence, and on the other hand, we can register vigorous socio-judicial negotiations taking advantage of the possibilities afforded by the technology of the watermill.

Notes

1. Author's translation of: 'Die Handmühle ergibt eine Gesellschaft mit Feudalherren, die Dampfmühle eine Gesellschaft mit industriellen Kapitalisten'.
2. See also Speck (1961) for a similar (but rather fragmented) find from Switzerland dating to the 2. Cent AD.
3. K-2716, the National Museum of Denmark. Three samples: 1040 ± 110, 1030 ± 110 and 1040 ± 85. Original samples from 1976 have been re-calibrated using Calib 7.0, thus providing the date used in the present text.
4. Author's translation of: 'Han [King Valdemar IV] vilde ikke, at Aaerne skulde løbe i Stranden uden først at have gjort Landegavn' From *Chronica Sialandie* 1356.
5. In the Mediterranean area the very large and early constructions, such as at Barbegal and Janiculum, also seem to have been produced by public capital and only later does a wider distribution of private mills begin to prevail (Wikander 2000, p. 393–4).

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RESEARCH ARTICLE

Carolingian *Pfalzen* and law

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ABSTRACT

The palaces (Pfalzen) of the Carolingian period, which had developed from the Frankish royal manors, were a completely new form of building in the eastern Empire. Their architecture reflected central functions of the new kingship. In spite of all the variations in those palaces that have been the subject of archaeological research (for example Aachen, Paderborn, Ingelheim, Frankfurt), a constant triad of worldly representation, religious cult practice and economical power is always discernible. This article considers the question of the juridical character of the palaces: the extent to which they were the expression of the structures of power and law within the Carolingian Empire, in other words served a function within the court offices and the manorial system: the extent to which they functioned as the seats of law-making and judgement; and the extent to which their architectural iconography and physical symbolism reflects acts and forms of a juridical practice that had its roots in the roman law. (Translation: David Wigg-Wolf).

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Harald Halfdansson; Louis the Pious; Pfalz; Ingelheim; Frankfurt am Main; royal court; court office; *villa*; *palatium*; *aula regia*; *capella*; manoralism; *fiscus*; *servitium regis*; *iudex*; *capitulare de villis*; legal symbolism; throne

On a June day in 826, the Emperor Louis the Pious looked down the Rhine from his *Pfalz* at Ingelheim near Mainz and was witness to an unusual display. Two years later, as if he had been present himself, Ermoldus Nigellus wrote in his panegyric to Louis:

> *Ecce volant centum per Rheni flumina puppes.*
> Velaque candidolis consociata modis,
> Denorum populis oneratae munere, nec non
> Heroldum regem prima carina vehit,
> *Te, Hludovice, petens* …[1]

'Heroldus' is Harald Halfdansson 'Klak', pretender to the Danish throne, who visited the Roman Emperor Louis, son of Charlemagne, at one of the most important *Pfalzen* of the period. Ingelheim is some 15 km from Mainz, the venerable old capital of the Roman province of Germania Superior and later one of the seats of the Merovingian kings (see Figure 1). The intention behind this remarkable visit is Harald's ceremonial subordination to the Emperor as his vassal ('Lehnsmann'), together with his investiture and baptism: Harald's aim is to gain the Emperor's political and military support in his struggle for the Danish throne, while the Emperor hopes to exercise political and military influence in an unsettled Denmark on the north flank of the Empire. In the days that follow, Harald, together with his family, retinue and courtiers – there were probably several hundred or so Danes – was to experience a court culture with extravagant ceremonies and, above all, splendid architecture that must have been overwhelming for them – Ermoldus's flowery language tells us how the Danes were in awe of the splendour of the court. At the harbour in Ingelheim, the king, his wife and retinue are met by Marshall Matfried with decorated mounts – a classic *adventus* – and received by the Emperor in the 'lofty hall', the *cesa aul*a, where they were also entertained.

According to the Royal Frankish Annals (*Annales regni Francorum*), the ceremonial baptism that followed was celebrated in St Alban's church in Mainz, with the Emperor's family as godparents to the Danish royal family (Rau 1968–1992, p. 130 ff., 324 f.). Afterwards, Harald is dressed in purple embroidered robes, crown, sword with *cingulum*, spurs, golden cloak, arm rings and white gloves – similarly Harald's family and retinue. This is a classic investiture *more Francisco*, according to Frankish tradition. A ceremonial mass then follows –

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Figure 1. The Rhine-Main region with Mainz and the *Pfalzen* at Ingelheim and Frankfurt (after Google maps).

still in Mainz – as well as a feast, after which they return to Ingelheim. The next day, they go hunting together on one of the islands in the Rhine opposite Ingelheim. In the evening, on their return to the palace, the *domus palatina*, the formal commendation of Harald to Louis is celebrated, with Harald kneeling before the King and placing his hands between his.[2] The ceremony also involves the presentation of mounts and weapons to Harald – 'according to old Frankish custom', *Francisco more veterano* – as well as the gift of the County of Rüstringen in Frisia in fealty, and finally 'wine-producing' lands, presumably further south. While Harald, his family and retinue return home in their richly laden ships, one of his sons and a nephew stay at court, entering into service in the imperial bodyguard.

To be sure, Danish ambassadors will already have been acquainted with Carolingian palaces and court ceremonial, having already visited palaces such as Compiegne or Aachen or attended the Imperial Diet at Frankfurt in 823. But this will have been the first time that the Danish *stirps regia*, together with the highest nobility, will have enjoyed such intensive, intimate and personal experience of the complex system of power in the new Roman Empire.

Pfalzen and court offices during the Carolingian period

Pfalzen played a particularly important part in this system. They were high-ranking seats of government that served as imposing bases for the exercise of the business of rule by the king on his travels ('Reisekönigtum') and were both factual and symbolic manifestations of royal power.[3] At the same time, they were central institutions in the young Carolingian legal system, forming what French scholars call a 'système palatiale' (Barbier 1990).

During the Carolingian period, *Pfalzen* primarily performed very much the same function as the royal courts ('Königshöfe'), the *villae*, which had existed since Merovingian times, and almost all *Pfalzen* were either extensions or developments of *villae* (Jacobsen 1999, p. 91 f., Zotz 2001b). Fine examples of this in East Francia are Aachen, Ingelheim, Paderborn and

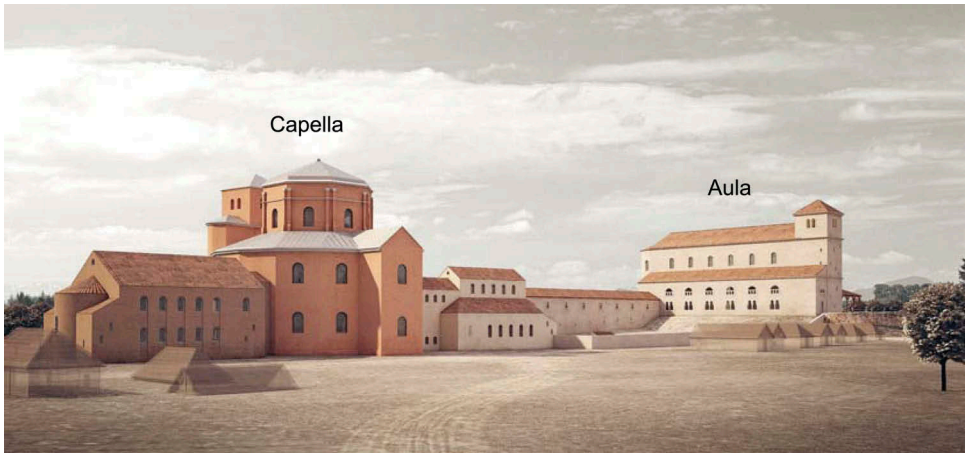

Figure 2. Model of the Pfalz at Aachen, *c.* 830 (Narmer Architecture Studio, Budapest [Zs. Vasáros, G. Nagy], ArchaeoPlanRistow, Köln [S. Ristow]). After Ristow 2016).

Frankfurt (see Figure 2). *Villa* and *palatium* are not always clearly differentiated in the written sources, and the distinction was a fluid one. In terms of their architecture, the *Pfalzen* were extensive complexes of buildings, the individual elements of which had distinct functions. In addition, the *Pfalzen* were also spiritual institutions within the structure of power.

The written sources use the Latin term *palatium* for 'Pfalz'.[4] 'Palatium' is the original name for the hill in Rome that from the Renaissance was known as the 'Palatine'. Here Romulus is purported to have founded the city of Rome, and from Augustus onwards, the Roman emperors had their residence here (Ziegler 1942, 1972). During the 2nd century, 'palatium' became the standard term for the imperial residence and was later extended to centres of imperial power such as Milan, Pavia, Arles and Trier. In Late Antiquity, 'palatium' also came to be used more generally for the 'court' as an institution. In the Merovingian period, north of the Alps, the term increasingly replaced the old Roman term for the official public building, the *praetorium*, with the result that there were numerous *palatia*, seats of royal power. From the late 8th century, it became the name for a concrete centre of power.

From the beginning, the Palatium ('Palatine'), the legendary site of the foundation of Rome, was regarded as a holy place around which Romulus had drawn the sacred boundary of the *pomerium*. As late as the 3rd century, a simple straw hut still stood among the splendid villas. This was the *casa Romuli*, reputed to be Romulus's original old house and revered as a holy site. For this reason, the term 'Palatium' ('Palatine') always had a sacred connotation: places of holy power. As early as the Synod of Frankfurt, convened by Charlemagne in 794, Italian bishops noted '*in aula sacri palatii*' and '*capella sacri palatii*' (*Libellus sacrosyllabus episcoporum Italiae* [MGH Conc. 2] 130 f.: Orth 1986, p. 181 f., Zotz 2001a, p. 21).

According to Annie Renoux (2001, p. 29 f.), originally during the Merovingian period, the *palatium* was above all a prestigious building manifesting the king's *auctoritas*, but under the Carolingians became 'a royal attribute par excellence' and served to legitimate power. 'The *Pfalzen* formed a network composed of places where the king exercised his power and which he periodically visited during the course of the travels he had to undertake. They served to establish the *regnum*. This conceptual background was enriched by the king's consecration and the *renovatio imperii*. The narrative and literary tradition presents the *Pfalz* as a holy place where a holy personage resided. This concept was reinforced by the increased sacralisation of power and of the person of the emperor and king. The *Pfalz* is an anticipation of paradise'.

This is confirmed by the special position of the *capella*, the court chapel, a college of literate clerics known as the *capellani*. The *capella* (Fleckenstein 1959, p. 11 ff., 1991) accompanied the ruler from *Pfalz* to *Pfalz*, performed important administrative and programmatic religious functions and composed the central administrative organ of the empire. The church in the *palatium* is named after it: the chapel, the religious pole beside the worldly pole of the *aula*. The *capella* grew out of the group of clerics who guarded the old Frankish relic, the

cappa, the halved cloak of St Martin of Tours, the patron saint of the Franks. Since Chlodwig the cloak always had to accompany the kings on their military campaigns and under the Carolingians from the early 8th century onwards was kept permanently at court. This too demonstrates the century old sacral character of the Frankish Carolingian kingdom.

In addition, the *palatium* was also used as a wide-ranging term for the royal/imperial court as a group of persons within the structures of power. Wherever the Emperor was, there was the *palatium* – the documents issued at or by the court always carried the note '*actum palatio*' (Zotz 1993, col. 1994). The identification of *palatium* with the imperial court is particularly apparent in Archbishop Hincmar of Reims's programmatic work *de ordine palatii*,[5] written in the autumn of 882 but based on an older work by Adalhard of Corbie that is now lost. It includes an idealised description of the structure and functions of the court offices (see Figure 3): beneath the king and the queen, who sometimes had her own court, came the *capellanus* (from 825: *archicapellanus)*, who was the head of the entire court clergy (*capella*). Next to him was the head of the royal chancellery (*cancellarius*), who was responsible for documents, charters and other written matters. The *ministri*, the highest court officials, were probably of somewhat lower rank. They included the *camerarius* (chamberlain), the *comes palatii* (count palatinate), the *senescaclus* (seneschal ['old servant'] – a kind of 'head of administration'), the *buticularius* (cup bearer), the *comes stabuli* (count of the stable), the *mansionarius* (quartermaster), four *venatores principales* (principal hunters), as well as a *falconarius* (falconer). Subordinate to these ministers, who each had political responsibility for their entire own domain (for example, the army or the state finances), were a larger number of *ministeriales* with less important functions.

The *Pfalzen* as part of the system of Carolingian manorialism

From Merovingian times, the basis of the Frankish rule and the exercise of power was manorialism (Rösener and Devroey 1989, Müller and Hermann 1999, p. 115 ff., Kropp and Meier 2010, p. 97 ff., all with additional lit.). This meant almost absolute disposition over the land as well as all that was on it and was part of it: mineral wealth, water, buildings, plants, game, livestock and persons. From the 5th century, the Frankish Kingdom, which in the 8th century had passed from the Merovingian to the Carolingian ruling dynasty, was characterised by continual expansion and occupation. About 500, the Franks extended their kingdom across the Rhine to the East, and the area around the Middle Rhine and the Lower Main attained a strategic position, becoming one of the key areas of the Frankish Empire. Most of the land became royal property and was divided into fiscal units. By making use of agricultural resources and the forests for themselves, as well as granting land in fee, the kings established the economic and human basis for the exercise of power.

From 8th- and 9th-century documents, it is clear that in the Rhine-Main region (as elsewhere in the Empire), there were extensive, connected complexes

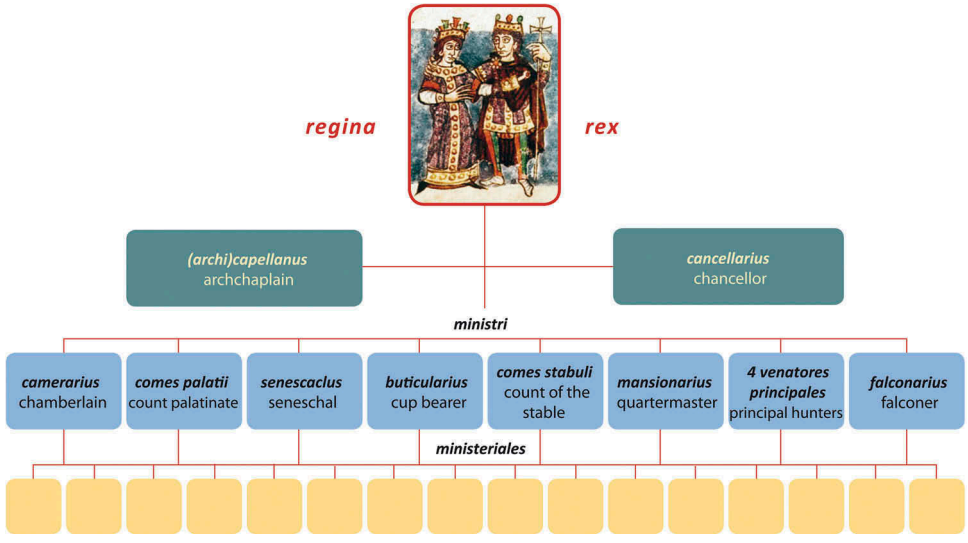

Figure 3. Scheme of the Carolingian *palatium* in the 9th century according to Hincmar of Reims.

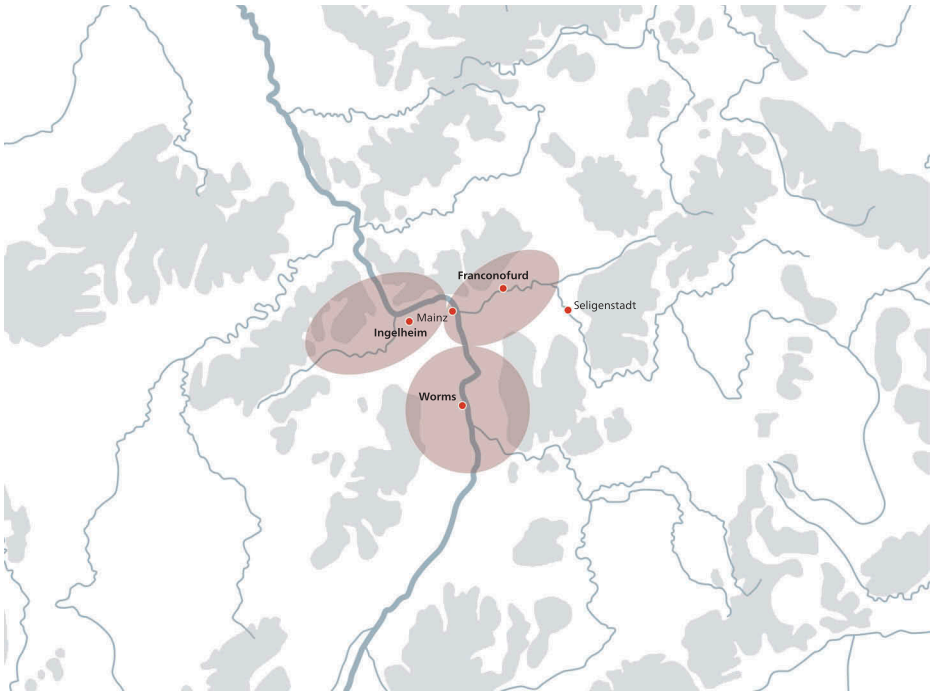

Figure 4. Carolingian royal property on the Middle Rhine and Lower Main with the fiscal units of Ingelheim, Frankfurt and Worms (after Backhaus, Karolingisch-ottonisches und salisch-staufisches Reichsgut, map 11).

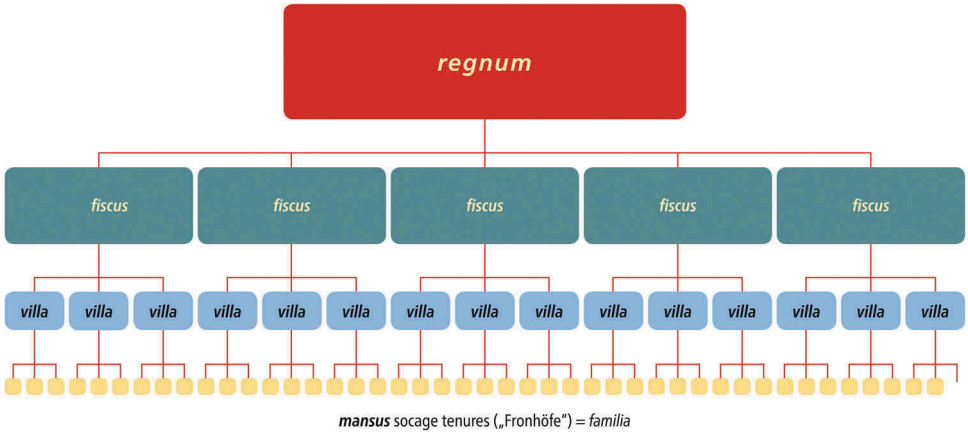

Figure 5. Scheme of the Carolingian manorial system.

of royal = imperial estates (see Figure 4) (Schalles-Fischer 1969, pp. 265 ff., Metz 1972, Backhaus 1984, Metzner 1992). This royal property was divided into *fisci* (Verhulst 1989). Under the Roman Empire, 'fiscus' referred to the totality of imperial revenues, but in Carolingian times, it meant exclusively what was royal property, not granted in fee. The *fiscus* was an administrative district (*ministerium*) consisting of several *villae* (see Figure 5), that in turn were subject to a head estate (*caput fisci, villa capitanea*). Each *villa* consisted of several hooves (lat. *mansus* = 'Fronhöfe') which free (*franci* or *libri homines*) or unfree farmers cultivated as tenants, and from the produce of which they had to pay dues or levies as well as performing manual services and providing transportation. Together, all the servants were known as *familia regis*. The Frankfurt *fiscus* is estimated to have consisted of 50–60 hooves (Schalles-Fischer 1969, p. 302).

From the 8th century, Carolingian royal *Pfalzen* in the narrowest sense, with imposing stone buildings, were built on the site of existing estates: for example, Aachen from 765, with further new buildings from 780/794; Ingelheim at the end of the 8th century; Frankfurt

823. Paderborn, however, was a new foundation in Saxony in 775/776; the site at Aachen has yielded archaeological traces from late antique (4th–5th cent.), Merovingian and early Carolingian (8th cent.) eras.

Obviously, the exercise and organisation of power in such extensive, heterogeneous imperial territory were impossible without legal measures. This meant above all the hierarchical administration and organisation of property that was mainly used for agriculture and forestry.

What was the function of the royal courts ('Königshöfe') within the Carolingian system of power, and so also the function of the *Pfalzen*, and how were they organised (see Figure 6)? Our main source of reliable information is the *Capitulare de villis* (Schalles-Fischer 1969, p. 338 ff., Metz 1981, Brühl and Verhulst 1983, Verhulst 1983, Wies 1992). This was initiated by Charlemagne around 800 and laid down in detail in 70 capitularies the organisation and administration of the royal properties for the entire Empire (Mordek 1991, Schmidt-Wiegand 2000). Capitularies are collections of decrees and edicts that are arranged into chapters; they were issued by the king, as well as by mayors of the palace *(maior domus)*, bishops and archbishops, but are not laws (*leges*) in the narrower sense. Nevertheless, by virtue of being announcements made by the ruler, they had a binding authority that was almost equivalent to a law. Most capitularies were issued in the first three decades of the 9th century.

The next main task of the royal courts and *Pfalzen*, including the agricultural estates that were part of them, was the *servitium regis*, the king's service. This mainly consisted of accommodating and supplying the royal court when it was circulating and had no fixed residence – this included the retinue, the royal household, a sizeable bodyguard and accompanying persons/guests (these could amount to several hundred people) – as well as producing material revenues, whether in the form of agricultural produce, money (tythe) or whatever.

According to the *Capitulare de villis*, the royal courts and *Pfalzen* were administered by an official appointed by the king and drawn from the high aristocracy together with lower-ranking officials subordinate to him. Significantly, the highest administrator of the royal courts is called *iudex* (pl. *iudices*), that is 'judge', but also *exactor* or *actor* ('executor' or 'manager') (see Figure 7). German historians generally translate *iudex* as 'Amtmann' ('bailiff'). Subordinate officials were assigned to the *iudex*, including *maiores* (mayors/Meier), *decani* (reeves/Vogts), *cellerarii* (cellerars), *telonarii* (toll collectors), *forestani* (foresters), *poledrarii* (stud managers), *falconarii* (falconers) and many more. The *iudices* were themselves directly responsible to the king or queen; the latter explicitly had direct, supreme responsibility for the administration of the estates. In the late 9th century, the central *Pfalz* officials, seneschal and cupbearer also received additional authority over the *iudices* (see Figure 8).

The list of the various productive activities which were the task of the royal estates included cultivating all kinds of cereals, fruits and vegetables that were usual at the time, as well as pulses and medicinal plants, breeding and keeping cattle, horses, sheep, goats, pigs and poultry, hunting dogs and birds, fish farming and the construction of mills, making beer, wine and fruit wine and many other tasks. The royal estates were also expected to house numerous

Figure 6. Reconstruction of the Pfalz Franconofurd and its surroundings, *c*. 860. The reconstruction is made in accordance with the most recent excavations by A. Hampel 2012–14 (Hampel 1994, 2017) and executed by S. Ristow (Cologne), Architectura Virtualis (Darmstadt), Archimedix (Ober-Ramstadt), Archäologisches Museum Frankfurt.

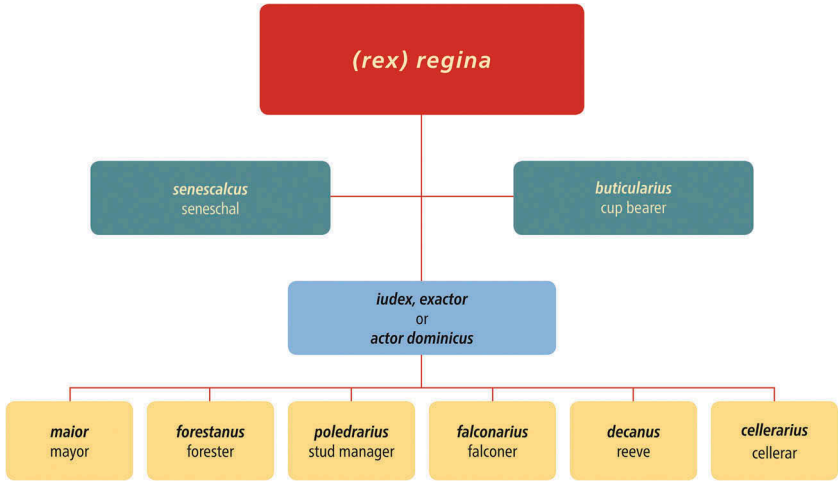

Figure 7. Scheme of the administration of the *villae* and *palatii* according to the *Capitulare de villis.*

Figure 8. Carolingian or Bavarian manorial lord. St. Benedict in Mals, Vinschgau. Late 8th cent. (photo: Amt für Bau- und Kunstdenkmäler Bozen-Südtirol).

craftsmen, from smiths and blacksmiths, cobblers, turners, cart wrights and shield makers to brewers, bakers, soap boilers and net makers. The *iudices* oversaw and had overall responsibility for these agricultural institutions, which could often be quite widely scattered and were combined into a *fiscus*. The *iudices* were also made responsible for the well-being of the free and unfree tenants ('Hintersassen') and the farm labourers – the *familia* of the king – ensuring that they were adequately supplied. Their responsibilities also included overseeing consumption on the estate, securing seed-good, supplying the army and supplying the royal court on its travels, as well as storing and selling surpluses. The latter had to be delivered to the royal treasury, either in kind or in silver. Everything had to be accounted for, and to this end, there were detailed inventories of the estates known as *urbaria*, for example, the *Brevium exempla*.[6]

Although all of these rules and regulations cannot be regarded as a legal system of norms in the narrowest sense, they do have a distinctly legal character and illustrate in a remarkably graphic manner how, at a time when a binding legal and judicial system was being rediscovered and constructed, efforts were undertaken to ensure the normative character of the manorial system. Under the Carolingians, these regulations are closely linked with the royal courts and *Pfalzen*.

Palaces and royal courts as places of legislation and judgement

When the king was in residence at the palaces, they served as seats of justice. Not only did deliberations, celebrations and negotiations take place, official documents were signed there too – a legal procedure that today has to be carried out by offices, notaries

and courts – laws and capitularies were promulgated, trials were conducted and sentence was passed. At the Synod of Frankfurt in 794, for example, not only was the Frankfurt Capitulary issued, which defined a binding system of weights and measures, a currency reform was also enacted that included the binding introduction of the new denarius (penny) for the entire Empire.

> In every place, in every town and in every market the new denarii are to circulate equally and be accepted by all. If the coins bear our name, are of fine silver and of full weight, and if anyone anywhere refuses to accept them either when buying or selling, then he shall, if he is freeborn, pay a fine of 15 shillings to the King … (Fried 1994b, p. 19 ff., quote from chap. V).

Prominent examples of royal justice, the king's court, are provided by the trial of Tassilo, Duke of Bavaria, who was deposed by his cousin Charlemagne at Ingelheim in 788, and finally at Frankfurt in 794 (Becher 1993, 2005, Fried 1994a), or the trial in Frankfurt in 823, for the illegal seizure of monastery lands, of Nantcharius, the *actor dominicus* there and a member of an old Carolingian aristocratic family (Schalles-Fischer 1969, p. 324 f., Metz 1972, p. 212).

However, the *Pfalzen* were also the seats of more everyday justice. The royal estate ('Königsgut') enjoyed immunity; the *fiscus*, with its centre either at a royal court ('Königshof') or a *Pfalz*, formed a judicial district on its own; the royal court ('Königshof') was a site of trials (Verhulst 1989). The *Capitulare de villis* declared that the *iudices* were local judges responsible for legal disputes within their own district (*ministerium*), that is for the free tenants ('Königsfreie') and the royal *familia* (chap. 56) (Schalles-Fischer 1969, p. 340 ff.). Although the early medieval judiciary was essentially a one-stage system without hierarchical instances (Lück 2003, p. 218), Charlemagne explicitly granted the simple free on the royal estates the right to appeal to the King, whereby the *iudex* was on no account to interfere with this process (chap. 57) – apparently by no means an uncommon problem and a sign of a degree of arbitrariness on the part of the *iudices*.

On the iconography of the *Pfalzen*

When we consider the extent to which the *palatium*, the Carolingian court and its palace, was the symbolic and factual site of imperial acts, for example in the holding of court and in particular in 'government business', in commendation, in the ecclesiastical act of baptism, in the issue of documents, in legal pronouncements and in the passing of laws, then the question arises as to whether these legal aspects are reflected in the architecture and the structural arrangement of the *Pfalzen*.

Common to all of them are three architectural and functional elements: the *aula* as the prestigious seat and reception hall for the king; the *capella* as the spiritual pole of the king's sacred power; and the *camera* as the royal apartments (*c.* Figure 2) (Renoux 1999, p. 134 ff., 2001, p. 38 ff.). There is archaeological evidence for these three units at Aachen, Ingelheim, Paderborn and Frankfurt. In the *Pfalz* at Ingelheim, which Einhard ranked as one of Charlemagne's most magnificent buildings, in the early phase the apsidal hall with the throne apse as the *aula regia* and the relatively small triconch as *capella* were incorporated into an imposing semi-circular structure, an exedra – apparently a reference to Roman palace architecture (see Figure 9) (Grewe 2000, 2001, with earlier lit.).

However, there was no Merovingian *villa* to provide the basis for the *Pfalz* at Paderborn, which was built in the recently conquered lands of the Saxons, and was rebuilt and extended on several occasions. In all three Carolingian structural phases, the *aula* and the *capella* were spatially separate structures although they were related to each other (see Figure 10) (Gai 1999, 2001).

When Charlemagne stayed at the *villa* of Franconofurd in 794, the new and splendid classicising structures erected by his son Louis in 822/823 had not yet been built. Nevertheless, the sources tell us that he resided in the *aula* (*Libellus sacrosyllabus episcoporum Italiae* (MGH Conc. 2) 130 f.: Orth (1986), p. 181). A reconstruction (Wintergerst 2007, p. 20 ff., ill. 6–10, Plan 2, Wamers 2008) of the scant remains from the 7th century reveals that the Merovingian royal residence – and this will have been the form in which Charlemagne used them during the Great Council of 794 – already had stone meeting and residential buildings, as well as a small church which served as a memorial building for a young girl from the family of the *actor dominicus*: she died about 700 and was revered at the site over the centuries (Wamers 2015, p. 15 ff., ill. 5).[7] As such, the central elements of the *Pfalz*, the *aula, capella* and *camera*, were already functionally present at this early stage.

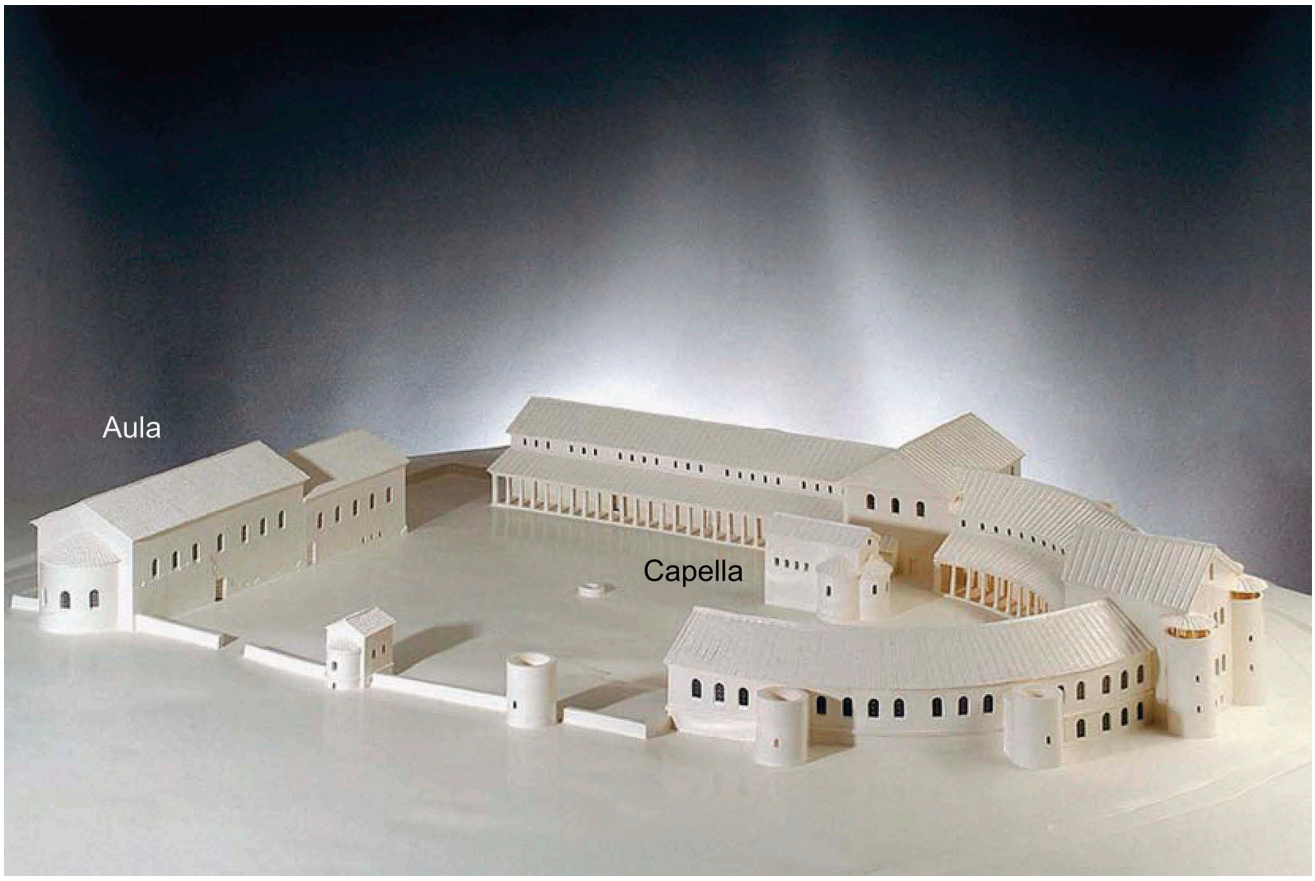

Figure 9. Model of the *Pfalz* at Ingelheim, *c*. 800 (photo: Kaiserpfalz Ingelheim - Forschungsstelle).

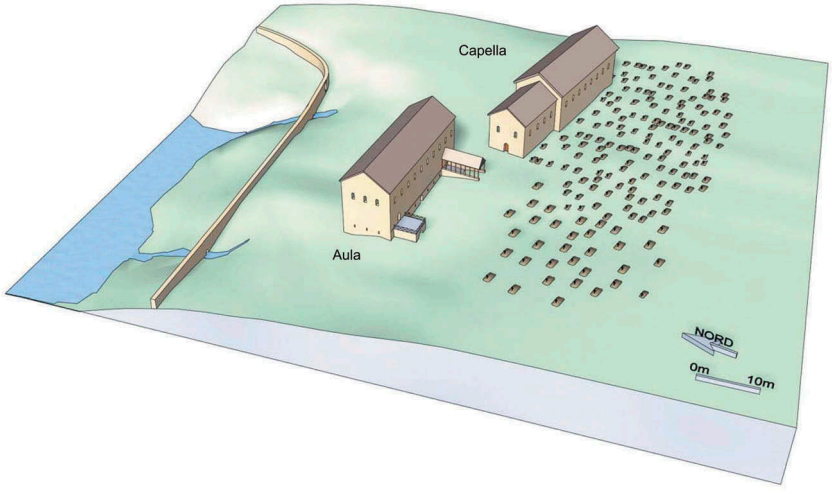

Figure 10. Model of the *Pfalz* at Paderborn, 1st phase, from 775/776 (after Gai, Die Pfalz Karls des Großen in Paderborn).

By 823, under Louis the Pious, a new magnificent *aula regia* had been built in a new architectural style. In the years before 855, his son Louis the German added a new *capella* – which he also did at Regensburg, his second man residence – and joined the *aula* and the *capella* with a corridor as at Aachen (see Figure 11) (Wintergerst 2007, p. 46 ff., Wamers 2008, 2011, 2015, p. 216 ff.).

We can only guess which rooms in the *Pfalzen* were used for the judicial proceedings of the *iudices*. The *aula*, which Ermoldus Nigellus still described as the building 'for justice' (Renoux 2007, p. 27

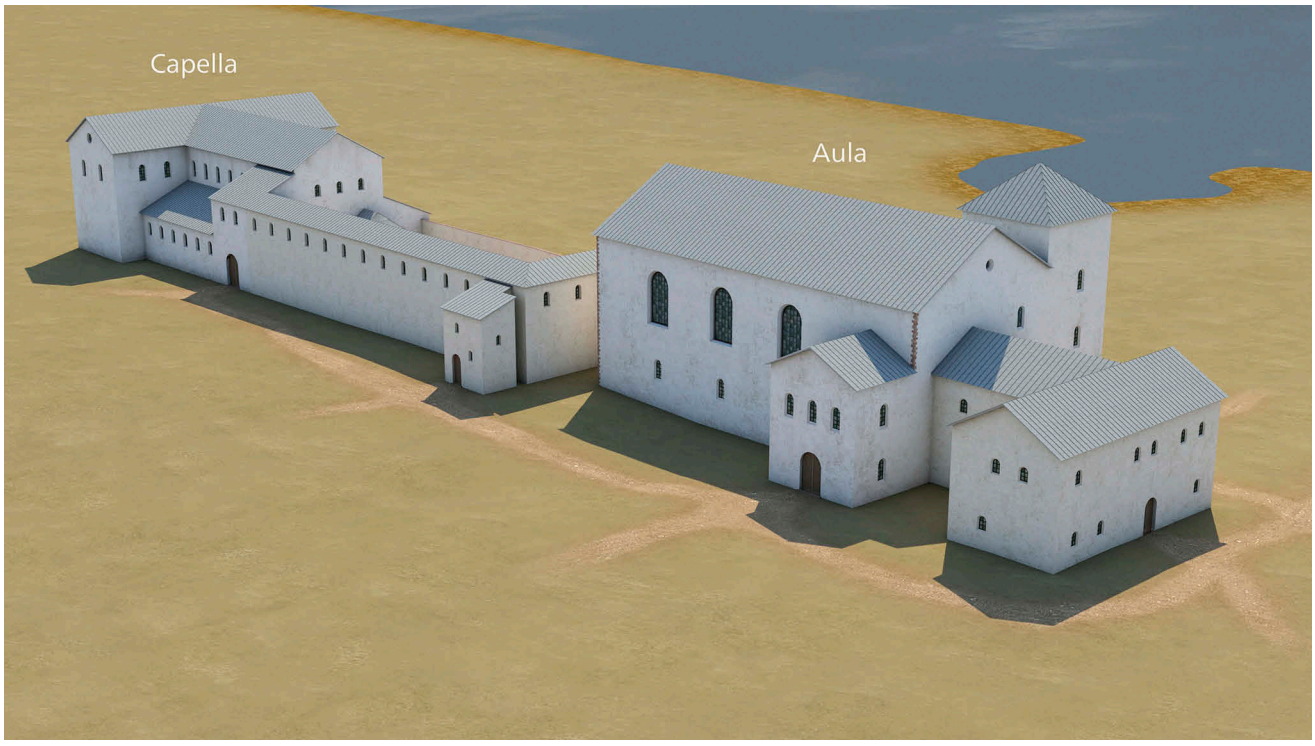

Figure 11. Model of the imperial Pfalz at Frankfurt am Main, *c.* 855. The reconstruction is made in accordance with the most recent excavations by A. Hampel 2012–14 (Hampel 1994, 2017) and executed by S. Ristow (Cologne), Architectura Virtualis (Darmstadt), Archimedix (Ober-Ramstadt), Archäologisches Museum Frankfurt.

[Justitiae virtus nullam sibi vindicat aulam …]), was certainly reserved for cases directly judged by the king or emperor, for example cases involving political matters of state such as that against Tassilo. Perhaps there was another important building. But where did everyday cases conducted by the *iudices* take place? At Aachen it is thought that the so-called *curia* was in the building situated in the corridor that joined the *aula* and the *capella* (*c.* Figure 2) (Riché 1981, p. 63). Similarly, we can only speculate as to where corporal or even capital sentences were carried out. For high medieval Frankfurt, the 'oldest' place of execution is thought to have been located on the south side of St Bartholomew's church, since the entrance to the nave there was known as the 'red door' (Schalles-Fischer 1969, p. 239 f.). This was where official measures such as the municipal scales and the cubit were kept in the Middle Ages (Wamers 2007, p. 348 f., ill. 7), and the fact that such places often enjoyed a long tradition might suggest there had been a court on the site as early as the 9th century. But it is equally possible that in Frankfurt cases were heard by the *iudex* in the building between the *aula* and the *capella*, or else in the west portico.

Pfalzen and legal symbolism

A note on legal symbolism is also worthwhile. In the early Middle Ages, judicial life mainly took place in an oral milieu (Kroeschell 1995, col. 512, Lück 2003, p. 210). As a result, legal acts were heavily influenced by a formulaic legal language (e.g. oath), by behaviour and gestures, as well as by legal symbols (e.g. judges staff), symbols of power (e.g. insignia) or regalia. As for the *Pfalzen*, the sources consistently mention a particular legal symbol that was vital for the exercise of royal power, whether as a ruler or a judge, the throne (on the throne *c.* Schramm 1954, p. 316 ff., Engemann *et al.* 1997, Wamers 2005, p. 43 ff., Steuer 2007).

An Italian source tells us that when Charlemagne stayed in the *villa* of Franconofurd in 794, he presided over the Great Council seated on a raised *sella regia* (*Libellus sacrosyllabus episcoporum Italiae* (MGH Conc. 2) 130 f.: Orth (1986), p. 181). The Aachen throne – interestingly in St Mary's chapel –

was made of marble slabs from the Holy Sepulchre in Jerusalem and set on six steps, just like the throne of the wise judge King Solomon (Schütte 2000, 2011, for a more sceptical viewpoint, see Ristow 2016, p. 38 f. and especially his Figure 18 with proposal for a reconstruction). Such a seat, which became the seat of empire when the king took his place on it, endowed whoever sat on it with authority as ruler and judge, with legal power and might (Wamers 2005, p. 43 f.). A fragment from Mainz, probably from the royal palace there, is testimony to an identically constructed throne of the late 8th century (see Figure 12(a)) (Schulze-Dörrlamm 2004). Holger Grewe (Kaiserpfalz Ingelheim, ArchimediX GbR and Grewe 2002) and the author (Wamers 2008) have accordingly reconstructed a similar throne for the *aula regia* in Ingelheim and Frankfurt, respectively (see Figure 12(b,c)).

Carolingian kings and emperors are always enthroned in images of 9th-century rulers (Schramm 1983, p. 33 ff., pl. 21–22, 36, 38–41, Wamers 2005, ill. 6–11). In the oldest of these, from shortly after 842, Emperor Lothar sits on a folding chair with lions' heads on the arms and feet, and he is characterised as a ruler with cloak, sword, crown, spurs and a long sceptre (see Figure 13(a)) (Wamers 2005, ill. 6). Probably this is the so-called Dagobert throne, which

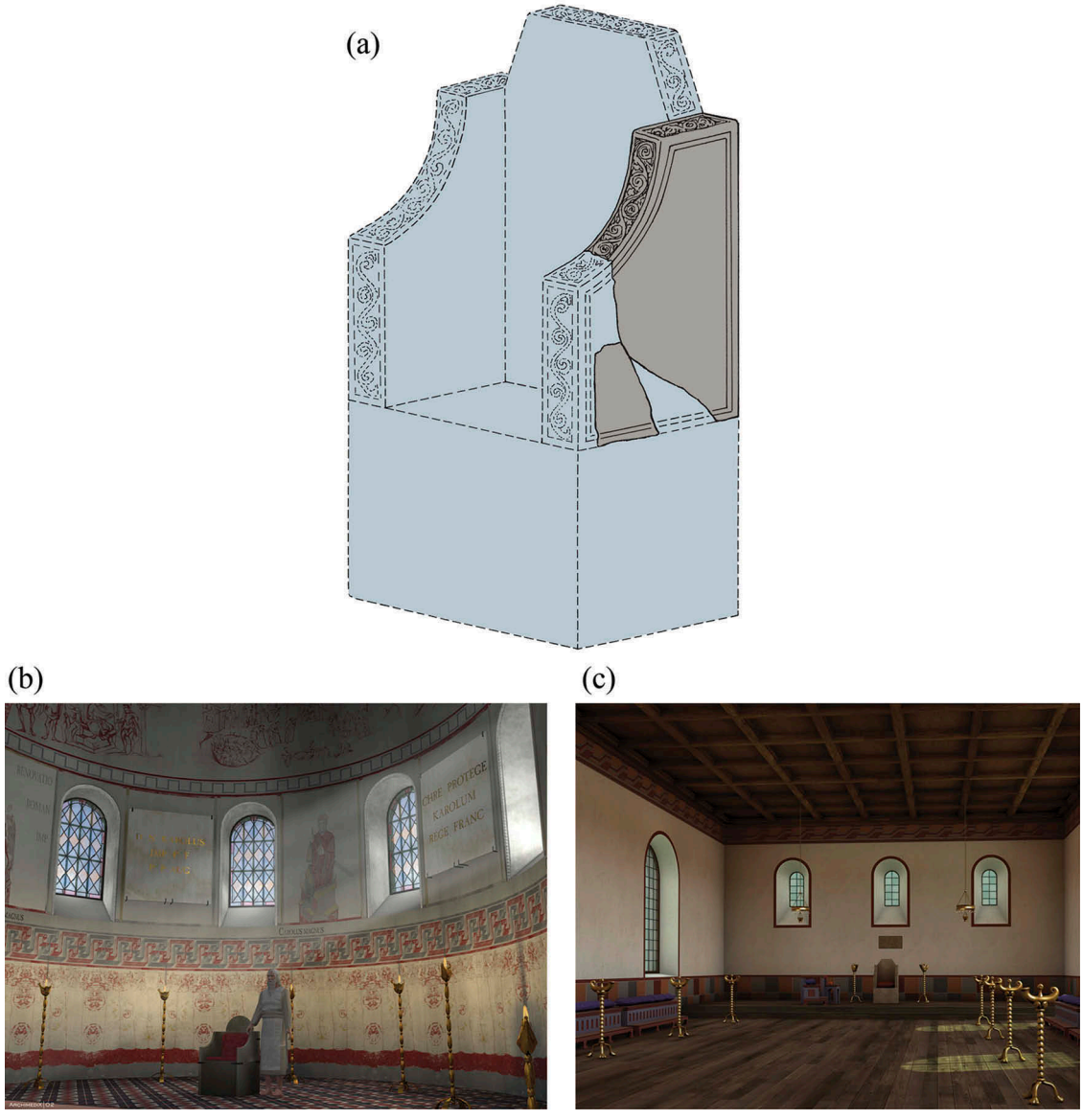

Figure 12. (a) Fragment of the throne from the royal palace at Mainz (reconstruction); (b, c) Reconstructions of *aulae* with throne at imperial *Pfalzen*. (b) Ingelheim, (c) Frankfurt (a. after Schulze-Dörrlamm 2004; b. Kaiserpfalz Ingelheim - Forschungsstelle; c. Archäologisches Museum Frankfurt - Architectura Virtualis Darmstadt).

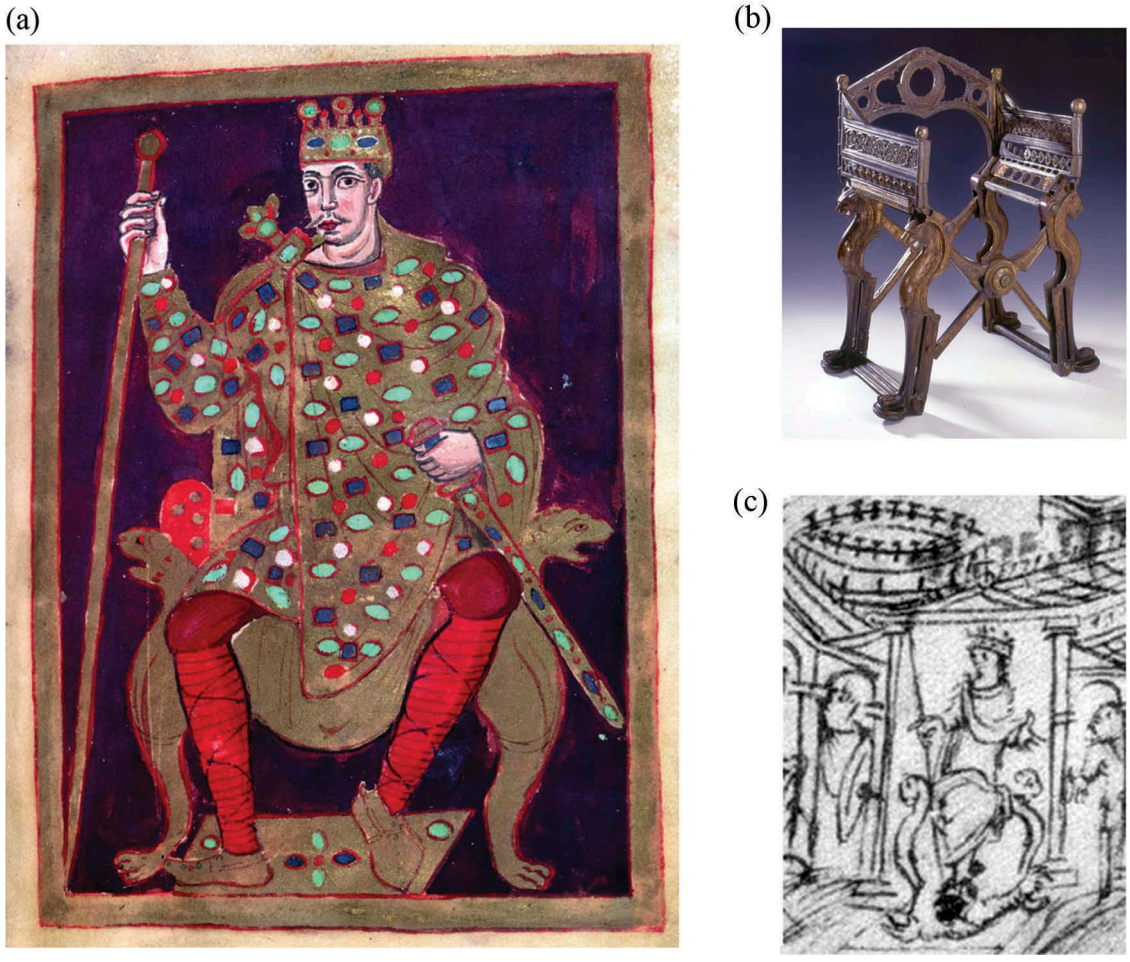

Figure 13. Examples of the folding chair as throne in the Carolingian period. (a) Image of Emperor Lothar I., after 842 (Lothar Psalter, Br.Libr.); (b) So-called 'Dagobert throne', 7th/9th cent.; (c) King David on a folding lion chair in his palace (Utrecht Psalter, fol. 51v, 820–830). (a. photo: British Library; b. Photo: RGZM Mainz; c. nach De Wald (1932).

was perhaps used by the Merovingian king Dagobert as early as the 7th century and was modified in the Carolingian period (see Figure 13(b)) (Wamers 2005, p. 45 f, cat. 11, with earlier lit.). It was often represented as the ruler's seat in the 9th century (see Figure 13(c)). The type is that of the *sella*, the official seat of the consuls and the high curule magistrates of Rome – originally it was the chair of the Etruscan and early Roman kings, who pronounced judgement seated on it in their chariot (*currus*) (Gugel 1975, Engemann *et al.* 1997, col. 738 f., Steuer 2007, p. 137). Numerous folding chairs have been found in almost four dozen burials from Southwest Germany, Switzerland, Austria, Hungaria and Italy where they performed as 'special gifts'. However, there is no distinct indication that they were also linked to an official or ruling function of the buried persons – except with the Anglo Saxon princely grave from Prittlewell (Gütermann 2011).

When Harald Halfdansson set off back down the Rhine and headed north with his family and followers, he was satiated with impressions of the imperial court and palaces and of the exercise of power and justice associated with them – an exercise which was essentially symbolic and semiotic. Many other Norsemen will have made the same experience in these decades. It remains a topic for research to assess the extent to which these close contacts with what was essentially the classical world, whether on the continent in the south and the south-east, or the islands in the west, contributed to the emergence of Nordic systems of power and justice.

Notes

1. Ermoldus Nigellus (1884), *Carmina*, v. 287–291: *'Behold, there come a hundred ships on the swell of the Rhine. Together with them approach the sails shining white, laden*

with gifts from the Danish people. The first ship carries Harald, the King, who seeks you, Louis …'. – On Ermoldus *c.* Schaller (1986). On the occasion in its historical (*c.* Helten 2011, 91 ff.) and historico-archaeological context, see Wamers (1994, p. 32 ff., 2005, p. 159 ff.). The historic value of Ermoldus' report is sometimes doubted, in particular because in his poem Mainz is not mentioned as the place of Harald's baptism, which stands in contrast to the Imperial Annals (Reichsannalen) and the *Anonymi Vita Hludovvici Imperator* and also because there are no archaeological findings corresponding to the wall paintings referred to in the poem (e.g. Geißler 2008). Even if Ermoldus' poem is a panegyricus, this general rejection is not convincing as there are so many detailed facts and realities.

2. The vassal ('Lehnsmann') folded his hands and placed them between the lord's ('Lehnsherr'), who enclosed them. In this manner, he symbolically placed himself under the protection of his new master. The enclosing of hands as part of the late Roman ritual of commendation is first recorded in the 8th century (Cordes 1991).
3. On the palaces as centres of power, see Zotz (1993, 2001a, 2003, 2010)), Jacobsen (1999).
4. On the following, see Zotz (2010).
5. Hincmar von Reims (1980), De ordine palatii; – see also Fleckenstein (1965, p. 33 f., 1971, 1976).
6. On *urbaria* and the *Brevium exempla c.* Hägermann (1997), Metz (1978, 1983).
7. The most recent excavations in the 8th-century Pfalz area by the Denkmalamt Frankfurt am Main (between 2012 and 2014) cannot yet be evaluated adequately as they are still being analysed (Hampel 2017).

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