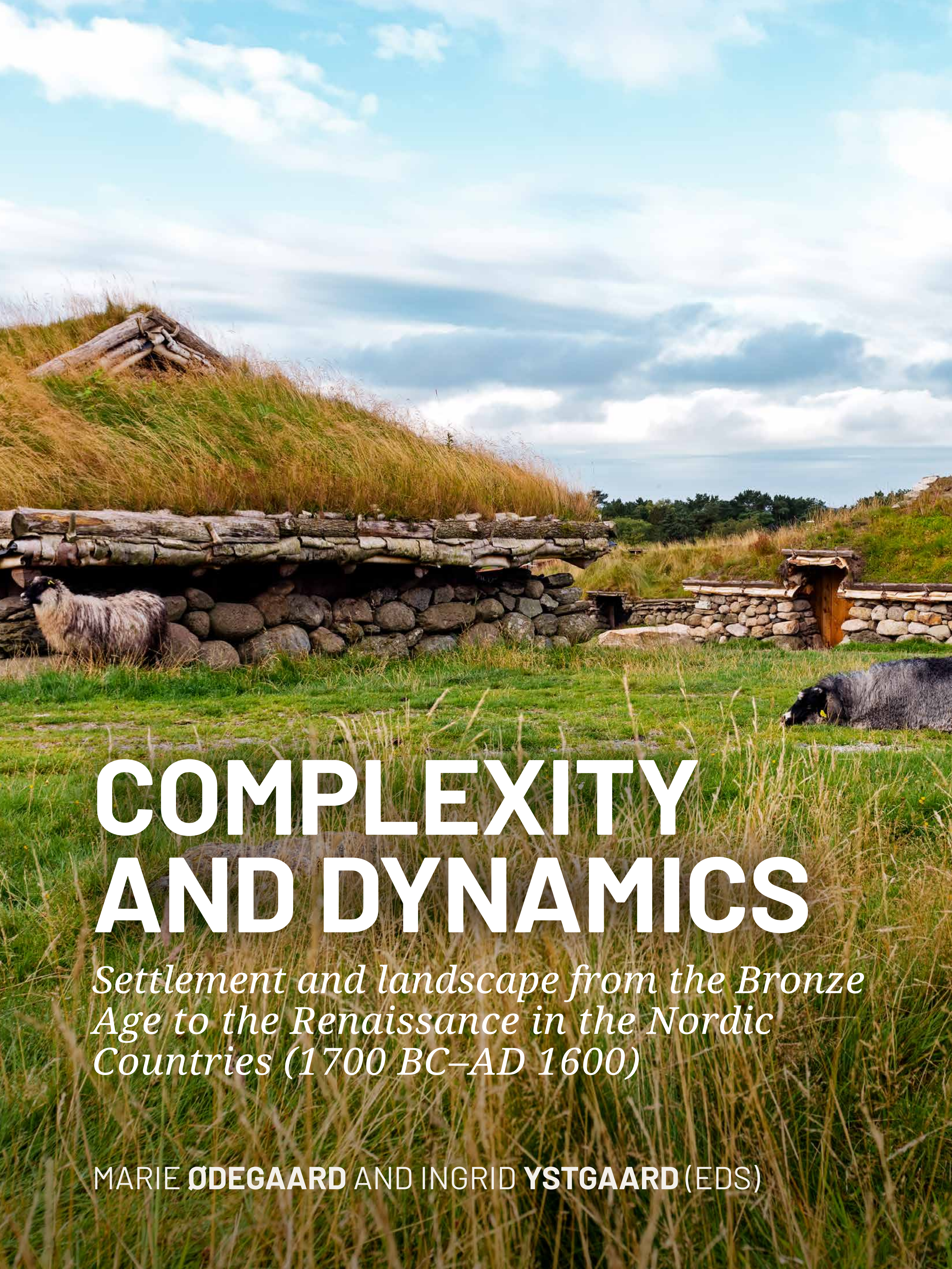

COMPLEXITY AND DYNAMICS

Settlement and landscape from the Bronze Age to the Renaissance in the Nordic Countries (1700 BC–AD 1600)

MARIE **ØDEGAARD** AND INGRID **YSTGAARD** (EDS)

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Contents

Foreword

This volume assembles contributions from two conferences in 2019. The first was a session entitled “What is a village? Challenging concepts and methods of Iron Age and medieval villages, hamlets and single settlements”, held at the European Association of Archaeologists in Bern in 2019, organised by Marie Ødegaard (Museum of Cultural History, University of Oslo/Museum of Archaeology, University of Stavanger), Lars Erik Gjerpe (Museum of Cultural History, University of Oslo) and Mads Dengsø Jessen (National Museum of Denmark). Researchers were invited to contribute with presentations discussing the concept of a village, as well as other concepts of local community organization in prehistoric and early historic societies, considering geographical and temporal variations, new datasets, new methods as well as new theoretical insights. The same year, as part of rescue archaeology excavation of an Early Iron Age settlement at Dilling in southeastern Norway, the so-called “Dilling project” at the Museum of Cultural History in Oslo, researchers from other geographical areas of Norway and other Scandinavian countries were invited to discuss Iron Age settlement organization and agrarian production. The aim of the conference was to contextualise the settlement at Dilling within a Scandinavian framework and to discuss on a broader level the spatial ordering of Iron Age settlements and excavation methods and data. Most of the papers in this volume are from the two conferences, others include papers from invited authors.

We are very pleased that we can present 15 papers, including an introduction, on prehistoric settlement organization. Together, these papers open substantial regional perspectives; however, most contributions still center on studies within national boundaries. It is our hope that this volume will put these papers within a wider discussion of settlement organization in a *longue durée* setting, from the Late Bronze age to the Renaissance. New data and approaches on material culture, settlement forms and landscape organisation unveil vivid and intricate social patterns of prehistoric communities, presenting different analogies and approaches to be discussed not only in, but also beyond, Scandinavia.

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We are grateful to all the authors and participants in the conferences for making this volume possible. We would also like to express our cordial gratitude to all peer reviewers and to Richard Peel for proof reading. Finally, our heartfelt thanks to our publisher Sidestone Press.

Oslo / Trondheim, 22.06.2022
Marie Ødegaard and Ingrid Ystgaard

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Settlement organization in Iron Age Scandinavia and beyond: Traditions, terminologies, regionalities and methodologies

Marie Ødegaard and Ingrid Ystgaard

Abstract

The nature of settlement organization is a core question in archaeological excavations and research. In some respects, settlement archaeological research in Scandinavia is characterized by variances notably in research traditions and terminology. These are largely the product of differences between national institutions and languages. However, contrasts in prehistoric and historic settlement organization appear between regions and periods rather than between the (later) national borders. Methodological advances are opening up a broadening range of opportunities in the years to come. By reviewing the topics of research traditions, terminology, regional and temporal variations, and developing methodologies, we here introduce the general topic of this book as well as the individual contributions.

Keywords: Settlement organization, research traditions, terminologies, regionalities, methodologies

Introduction

How did people organize their settlements in prehistory? This question is at the core of a large number of archaeological excavations throughout Scandinavia and beyond, and has remained so during the past three to four centuries. A few decades after the introduction and implementation of settlement archaeological excavations based on top-soil mechanical stripping, the influential book "Settlement and Landscape" was published (Fabech and Ringtved 1999). This book aimed to compare results and establish a new way forward for understanding settlement archaeology and landscape organization in northern Europe from the Stone Age to the medieval period. While the discussions on differences in research traditions and terminologies between the Nordic countries are still valid, new excavations and methodological developments that have taken place during the past two decades have made it necessary to discuss settlement organization again, in a broader comparative perspective. The aim of this book, therefore, is to present new research based on new excavations and/or material, which employ up-to-date methodologies. In doing so, we hope to contribute to a greater understanding of the complexity and dynamics of settlement and landscape organization in Scandinavia and beyond, from the Late Bronze Age to the Renaissance.

In *Complexity and dynamics. Settlement and landscape from the Bronze Age to the Renaissance in the Nordic Countries (1700 BC–AD 1600)*, M. Ødegaard and I. Ystgaard (eds.), pp. 11-28. Sidestone Press, Leiden.

Figure 1. Settlement traces and their spatial distribution at Dilling, Moss, Southeast Norway. Illustration: Jan Kristian Hellan; Museum of Cultural History, University of Oslo.

At the outset, we highlight four aspects which characterize settlement archaeological research in Scandinavia today. First, differences in research traditions have contributed to notions of differing developments in settlement organizations within the Scandinavian countries. Second, differences in terminology between languages regarding settlement organization, particularly the words in Scandinavian languages for single farms and villages, contribute to different interpretations between national research traditions. Third, settlement organization differs between regions and periods rather than between the later national borders. Lastly, methodological developments contribute to increasingly rapid developments in results and interpretations, and open for a broadening range of opportunities in the years to come. The discussion of these four aspects, which forms the first part of this introduction, prepares the ground for our presentations of the contributions to the volume.

Continuous excavations, in addition to new interpretations of older finds, generate a research literature which is growing fast. In what follows, we will discuss the developments in settlement organization from a Scandinavian point of view, including, however, insights from beyond this geographical area. Furthermore, we will focus on Iron Age settlement organization, but also consider earlier settlement studies as far back as the Bronze Age, as well as later studies including the Middle Ages and the Renaissance. Our reflections on terminology and methodology are also valid for sites dating beyond this time span.

Research traditions

The question *what constitutes a village* has been widely discussed within different disciplines, such as geography, history, archaeology and anthropology. In archaeology, the *spatial* properties of settlements are best preserved for analysis, and therefore frequently discussed. Definitions are, as we will see, often related to the numbers of farms, numbers of buildings and spatial properties of farmsteads.

Settlement organization has been regarded as developing differently in the Nordic countries. Single farms were considered the dominant settlement type in Bronze and Iron Age Norway and parts of Sweden and Finland (Widgren 1997; Lillehammer 1999). In Denmark, the general impression is that single farms dominated during the Bronze Age. The earliest villages emerged in northwest Jutland in the Pre-Roman Iron Age and first in the Mid-Roman Period in southern Jutland (Ethelberg 2000:192; Nielsen 2020: 895–914, Haue this volume). Differences within each nation were, however, recognized, and often understood as related to topographical and geographical preconditions (e.g., Lillehammer 1999; Mikkelsen 1999). In line with this, some scholars considered single farms as characteristic of the Scandinavian periphery with marginal agrarian land (Kaldal Mikkelsen 1999:189; Myhre 1999). However, clustered settlements (*klyngetun*) are not uncommon in western Norway in historical times, demonstrating that single farms and clustered settlements can be found within the same landscapes (Salvesen 1996; Langnes 2016; Røyrane 2018), and that topography in itself cannot explain differences in settlement types (e.g., Kaldal Mikkelsen 1999).

The differences in interpretations of settlement organization between the Scandinavian countries, therefore, stem in part from divergent research traditions rather than from divergences in empirical data (Widgren 1997; Lillehammer 1999; Skre 1999; cf. also Wickham 1992). The so-called retrospective or retrogressive method in history and to some extent in archaeology has been more strongly represented in Norway than in Sweden and Denmark. This has contributed to interpretations that emphasize structural continuity in settlements from prehistoric to historic periods (eg., Sandnes and Salvesen 1978; Österberg 1981; Pilø 2005, Amundsen and Fredriksen 2014; Gjerpe 2017; Grønnesby 2019). The method was considered valid because of the strength of the idea that Norwegian farmers had more personal freedom and thus more settlement stability than farmers elsewhere in the Nordic region, where tenant farms under larger estates were seen as being more common (Øye 2000; cf. Wickham 1992).

While the discussion of spatial properties related to the number or farms and their composition is still valid, other archaeologists focus more on aspects of interaction and cohesion between units in a farming society when discussing differences of settlements. Different weighting of social and economic criteria has led to variant conclusions and definitions of what constitutes a village, a hamlet, and a single farm. Formal institutions, for instance ritual activities, churches, or schools, are of consequence for the organization of local communities and often seen as crucial for what constitutes a village (e.g., Widgren 1997; Rindel 1999; Øye 2000; Myhre 2016). Differences in judicial and social rights in questions of land ownership, land tenure, and land use are seen as being of great importance as factors determining the type of settlement organization (e.g., Pedersen and Widgren 1998:421; Myhre 2002:135; Wembley 2008; Herschend 2009; Ødegaard *et al.* this volume). Interdependency between farmsteads, such as common work in the harvesting season and a common organization of specialization and surplus production, are equally important (e.g., Fallgren 1993:73–75; Herschend 2009:322–325; Frölund 2019:148; Gjerpe 2019, this volume; Rødsrud and Fredriksen this volume; Frölund this volume; Ystgaard this volume).

Figure 2. Documentation of houses before and now. A) Lars Pilø drawing building plans at Forsandmoen, Western Norway. Photo: Sf29846 ©CC BY-NC-NC, Digitaltmuseum.no B) Sunshine presents challenges for Guro Skogvold gathering documentation on an iPad at Dilling, Moss, Southeast Norway. Photo: Museum of Cultural History, University of Oslo.

Terminology: Villages, hamlets, and farms

Differences in interpretations between the Nordic countries also stem from differences in terminology (Erixon 1960; Lillehammer 1999). The words village, hamlet and farm are commonly used to describe settlements throughout the world, but they are extraordinarily difficult to define with precision (Roberts 1996). The content of these concepts varies considerably, according to which geographic area, period, or discipline is the starting point (Øye 2000:14). Within disciplines, there are also differences of opinion (see e.g., Roberts 1996; Langnes 2016; Myhre 2016; Gjerpe 2019).

English *village* corresponds to modern Danish *landsby* and modern Swedish *by*. In Norwegian, however, the term *landsby* is much less used, and often interpreted within a strict historical meaning in which the settlement must include a church if it is to be called a village (Widgren 1997:41; Lillehammer 1999; Øye 2000). Hence, there has been a reluctance to accept the presence of villages in Norwegian prehistory (Øye 2009).

The word for *farm* in Old Norse was *bær*/*býr* or *garðr*. The latter denoted settled and arable land enclosed by a fence, etymologically identical with the English *yard*. Both terms can denote 1) a single farm, 2) a clustered, agglomerated farm, or 3) a tax object – a land assessed farm (Bjørkvik 1981:625). Norwegian *gård*, therefore, does not translate directly to English *farm*. Instead, it can denominate a variation of settlement organizations, including *mangebølt gård* which can consist of several farmsteads (Norw. *tun* or *bruk*) with bordering fields, meadows, and enclosures and with a common name (Rønneseth 2001[1974]:50). In some instances, Norwegian *gård* thus corresponds to Danish *landsby* and Swedish *by* (Widgren 1997; Lillehammer 1999; Øye 2009). Accordingly, there are not necessarily any structural differences between the Norwegian farms with several holdings (*mangebølt tun*), Swedish *byar*, and Danish *landsbyer* (Widgren 1997; Pilø 2005).

In addition, the Nordic languages lack a distinction made in international terminology between the German *Dorf* and *Weiler*, and between the English *village* and *hamlet*, and French *village* og *hameau* (Widgren 1997:41). The Scandinavian terms *by*/*landsby* thereby also cover the English hamlet. Thus, villages can be very small (down to two-three farmsteads) to rather large (more than 50 farmsteads) (Riddersporre 1999). European and Scandinavian historical research has accepted that having 10–15 farmsteads is the lowest criterion that must be met for a settlement to be deemed a village (Widgren 1997:41). However, in archaeological research the minimum size is often set to three farmsteads (Becker 1983:6; Mikkelsen 1999:178; Hansen 2017:10; Gjerpe 2019) or even two (Erixon 1960; Sporrong 1985:196; Sabo and Söderberg 2018:12). In sum, the terminology regarding farms, hamlets, and villages between the Scandinavian languages, and between the Scandinavian and other European languages, is vague and fluid, and often eludes definitions (Øye 2009).

When these topics have been treated in national frameworks, differences in research traditions and terminology between the Scandinavian and Nordic countries have reinforced differences in interpretations of settlement organizational principles. Today it is clear that settlement patterns in the Nordic countries demonstrate regional rather than national differences, and that they were more dynamic than previously thought. Villages, nucleated settlements, and single farms co-existed in the Iron Age and medieval times, and single farms could also develop into subdivided multiple farms (Øye 2000:18).

Spatial organization: Regional and temporal variations

The spatial organization from the Bronze Age towards modern times in the Scandinavian countries shares many similarities, but when it comes to details, regional and temporal differences appear. Many scholars have discussed variations in building traditions between the Scandinavian countries, with particular attention to architecture (e.g., Skov 1994; Artursson 2006; Carlie and Artursson 2006; Martens 2010). There is a growing understanding of variations between and within regions, for instance regarding the degree of nucleation of settlements, the architecture of buildings, building sizes, and the occurrence of fences (e.g., Ethelberg 2003:165; Martens 2010). Different topography, geography and contact networks create different conditions for agriculture and way of life. This may explain some of the differences — not, however, all of them (e.g., Mikkelsen 1999; Rindel 1999; Øye 2000). While the traditional accounts of regional differences between and within the countries of Scandinavia can still be accepted as valid, the picture is being constantly deepened with new excavations and studies. Let us look at an example. Although the three-aisled longhouse with a barn is an architectural concept of *longue durée*, originating in the Early Bronze Age and lasting until the end of the Late Iron Age, new features were introduced over time, all with different intensity and regional distribution, adding increasing complexity to settlement forms and functions (Göthberg 2000; Oma 2016; Eriksen 2019; Nielsen 2020). Some building types only existed for a couple of hundred years, while others were in use for 500–600 years (e.g., Løken 2020). Trade networks, cultural contacts, and different social, political, and economic developments can influence the choices made by a community when it comes to the layout of buildings and settlements (Riddersporre 1999; Artursson 2005:148; Runge 2018; Martens 2020).

In southwest Scandinavia, northwest Germany and the Netherlands, the Early Iron Age houses were relatively short, consisting of four to six trestles (Ethelberg 2003:139f: Artursson 2005:88; Herschend 2009; Løken 2020). This geographical area is also where large prehistoric villages occur. Villages and nucleated settlements are rarely found east and north of this area (Sabo and Söderberg 2018:37), and in the rare cases they exist at all, they first occur from the time of the Common Era (Martens 2010). However, this picture continuously changes with new excavation results. Nucleated settlements with larger and more complex buildings have recently been found outside of the "traditional area" and are older than previously thought (e.g., Grønnesby 2005; Fransson 2019:155; Løken 2020; Diinhoff 2021; Gjerpe in prep; Haue this volume; Meling this volume; Ødegaard *et al.* this volume).

Throughout northwestern Europe, it has been recognized as a common feature that houses of the Late Bronze Age and Pre-Roman Iron Age lasted one generation before a new house was built a short distance away, so-called "wandering" farms or villages (Gerritsen 1999; Rindel 1999; Webley 2008; Herschend 2009; Martens 2010; Holst 2014). The period around AD 200 saw, in general terms, a change towards longer-lasting houses following each other in the same plot for several generations (Gerritsen 1999; Myhre 2002:107–108; Webley 2008:34–36, 149; Herschend 2009:140–141; Holst 2010:158; cf. Ethelberg 2003:278ff.). The process did not occur everywhere in the Nordic region, nor did it occur everywhere at the same time – not, for instance, in southern Jutland where houses were inhabited for one or two generations throughout the Roman and Migration periods before they were moved (Ethelberg 2003). The Iron Age societies of the Roman and Early Germanic Iron Ages were not static units, site-bound for many hundreds of years.

An overall picture of this Roman Iron Age trend can still be supported by new excavations (Løken 2020; Dahl this volume, Frölund this volume, Hjulström and Lindeberg this volume, Lindell this volume, Ystgaard this volume). However, new excavations and methods, such as statistical modelling of radiocarbon dates, challenge the notion of contemporaneity in this transitory process between and within regions (e.g., Haue this volume; Meling this volume; Ødegaard *et al.* this volume). This overall increasing stability of settlements nevertheless indicates large-scale social and economic developments, likely connected to changing agricultural practices, and changing notions of land holding and inheritance (Pedersen and Widgren 1998:421; Myhre 2002:108 with references; Webley 2008; Herschend 2009). Asymmetrical, stratified power relationships became increasingly visible and institutionalized, expressed through architecture, for example in larger houses and farmsteads, secondary residential rooms, perhaps for families of a lower social order, and other material expressions of social relations, such as marked grave mounds (Norr 1996; Karlenby 2007:135–136). This is also discernible in the invention of the hall and hall room, appearing around the beginning of the Common Era (Herschend 1997; Løken 2001) or even earlier (Ødegaard *et al.* this volume). Specialization in craft- and agricultural production was an essential part of this picture (Frölund this volume, Rødsrud and Fredriksen this volume, Ystgaard this volume).

It has been assumed that Iron Age buildings became larger over time and that farm sizes increased (e.g., Hansen et al. 1991; Webley 2008:51, 151; Diinhoff 2010:84), with buildings generally becoming increasingly complex with several rooms and entrances, longer life spans, and several phases (Pedersen and Widgren 1998: 421; Artursson 2005: 90, 92; Norr 2006; Martens 2010). While this is true to some extent, it is also clear that there were periods when farm sizes decreased. Such events were also subject to local and regional variations (see e.g., Artursson 2005:113; Martens 2010; Ødegaard and Winther *in prep*.). This is most clearly seen in the last part of the Late Iron Age: houses, on average, became shorter, while farm sizes generally increased. Activities previously carried out within one, multi-functional longhouse, were moved to an increasing number of smaller, complementary buildings (Øye 2002:276; Ethelberg 2003:130, 318; Sørensen 2003:437, 448). Employment of radiocarbon dating and statistical modelling in comparison with analysis of typological features increases our understanding of when different types of buildings, tied to different functions, were constructed within the settlements (Løken 2020; Iversen and Laursen 2021; Ødegaard and Winther *in prep*.). Large aristocratic farms with specialized crafts and cult practice, such as Tissø on Zealand (Jørgensen 2008) and Järrestad in southeastern Scania (Söderberg 2003), were still unusual in the Late Iron Age. However, metal detector finds, geophysical prospections and new excavations continuously add nuance to this picture (e.g., Gustavsen et al. 2020; Grundvad 2021; Hjulström and Lindeberg this volume).

In the period between the 6th and 9th centuries, there is a marked decrease in the number of known settlements (e.g., Göthberg 1995:98–99; Ethelberg 2003:317; Diinhoff 2009; Sabo and Söderberg 2018; Hansen 2019; Iversen and Laursen 2020; Oinonen *et al.* 2020; Mjærum *et al. in prep*.). Settlement sites often demonstrate discontinuity from the Early to the Late Iron Age (e.g., Göthberg 1995; Löwenborg 2010; Gjerpe 2017; Hansen 2019; Lindell this volume). The complexity behind the dramatic events both in the short term and the long term in northern Europe in Late Antiquity has been unfolded in an increasing corpus of studies presented from the turn of the century onwards. Natural historians, archaeologists, historians and historians of religion have presented different angles on the events of this period, but they have a common feature – they have been circling around the climatic incident following a series of volcanic eruptions in the Northern and Southern hemispheres between AD 536 and 540, and a following outbreak of plague across the European continent (e.g., Axboe 2001; D'Arrigo *et al.* 2001; Löwenborg 2012; Gräslund and Price 2012; Sigl *et al.* 2015; Büntgen *et al.* 2016; Keller *et al.* 2019; van Dijk *et al. in press*). Discussions regarding trajectories, causes, and effects of the Late Antique disruptions cover such fields as the centralization of political power within the Nordic region and the introduction of new notions of inheritance and reorganization of agricultural strategies and settlements, in addition to climatic events and plague (Myhre 2002; Iversen 2017; Hansen 2019). It should be pointed out that settlement decrease and a re-structuring of society were also discussed in pre-1999 research (e.g., Gräslund 1973; Myhre 1985; Näsman and Lund 1988; Pedersen and Widgren 1998:303–305). New research also supports earlier suggestions that potential settlement decreased and that a re-organization in Scandinavia had already started in the centuries leading up to the 6th century, indicating long-term societal changes following the fall of the Western Roman Empire (e.g., Gundersen 2019; Ystgaard 2019). Furthermore, regional differences between and within the Scandinavian countries characterize both the impact of the climatic events, as well as patterns of re-organization of settlement and the centralization of political power (e.g., Solheim and Iversen 2019; Hansen 2019; Lindell this volume; Loftsgarden and Solheim this volume).

From c. AD 900, there were major changes in the building tradition, with the occurrence of one-aisled constructions with or without earth-dug wall posts (Skov 1994; Artursson 2005). In Germany and the Netherlands, one-aisled constructions are already known from the 7th century; however, in the northern Schleswig area they are mainly known from the medieval period (Sørensen 2003:438 with references). At some sites, like Østergård in southern Jutland, Denmark, the ground area of the houses increased (Sørensen 2011). In other regions, building of smaller houses for special functions intensified (Göthberg 1995:98; Øye 2002:277). Barns were moved out of the dwellings, indicating a new life form with greater distance to the animals (Øye 2002:283; Oma 2016). Post-built constructions were previously thought to disappear at least by AD 1000 (see Øye 2002:281 with references). However, buildings with earth-dug posts from the (late) medieval period are now known from a number of sites in Scandinavia (e.g., Øye 2002:279; Diinhoff 2009:160; Søvsø 2009; Søndergård this volume). Medieval buildings and settlements are more thinly represented than buildings and settlements from earlier periods. This is a paradox, especially in view of the generally accepted belief that there was a population increase, at least from the Viking Age, in Scandinavia (Øye 2002:246; Ethelberg 2003:372; Sabo and Söndergård 2018). In Norway, the missing settlements are believed to be hidden under the historic farms, indicating that the present farm structure might date to as early as the 7th century (Grønnesby 2019). In Funen, Denmark, the settlement organization in the 7th and 8th century changes significantly, reflected by farms moving together within fixed geographical structures that correspond to resource areas known from historical cadastral maps (Hansen 2019:327; see also Sørensen 2003:457). This suggest that the known settlement structures were established in the decades around 600 AD. This contrasts with the previously dominant labile and farm-based settlement structure and, at the same time, gives possibilities of increased administrative control (Hansen 2019:327).

Viking Age buildings are seldom recognized, which may be due to the introduction of new building techniques: the use of sill plates as base (e.g., Sørheim 2009; Kristiansen 2014; see also Hansen 2019) or log constructions (e.g., Berg 1989: 16; Weber 2002; Øye 2002:283 with references; Olsen 2009). These construction techniques leave few preserved traces of the buildings underneath the topsoil. However, other building constructions such as walls and fireplaces can be preserved, and such building traits help us to detect the establishment of, for example, Late Iron Age settlement in southern Finland (Heinonen this volume). It is widely recognised that our understanding of settlements and their structures from the medieval and early modern periods is sketchy, but as yet there are still comparably few excavations of sites from this time span due to, among other things, methods, research traditions and legislation (Martens 2009, Kristiansen 2014, 2019). In light of this, an analysis indicating that buildings with earth-dug, roof-carrying posts did not disappear completely, but occurred in Denmark in the Renaissance, is of importance for the understanding of medieval settlements (Søndergaard this volume).

New methods and data collections – towards increasing complexity and dynamics

While previous research to a greater extent relied on architecture and constructional elements of buildings as the most important form of data for the study of spatial and social organization, recent research has had an increasing range of opportunities for analysis thanks to new theoretical and especially methodological innovations and increased quantities of data.

Development and refinement of the methodological toolbox of settlement archaeology during the past decades has contributed to a range of new possibilities and results. An increasing understanding of settlement dynamics and complexity, leading to new strategies for excavations where top-soil stripping is used to uncover larger areas,

Figure 3. Top-soil stripping before and now: Same method, different attire. A) Trønd Løken following the excavator at Forsandmoen, Western Norway in the 1980s. Photo ©CC BY-NC-NC, Digitaltmuseum.no. B) Tharald Bull Strømnes, Ingvild Grønbeck and Eystein Østmoe following the excavator at Ørland, Central Norway in 2015. Photo: Åge Hojem, NTNU University Museum.

enables archaeologists to assess the spatial organization of settlements in wider contexts, beyond the buildings themselves (see e.g., Heidemann *et al.* 2012; Ystgaard 2019).

Developments in statistical treatment of radiocarbon dates allow for more detailed phasing of the sites. Bayesian modelling of radiocarbon dates can provide more accurate calculations of the life duration of separate houses, which in turn gives more nuanced insight into building sequences as well as into the spatial and temporal lay-out of a site. New statistical methods which provide higher accuracy of ^{14}C-dates can thereby lead to changes in (older) typological assumptions (e.g., Sørensen 2011; Hansen 2017:54–59; Herschend 2017; Laursen and Holst 2017; Ethelberg 2018; Iversen and Laursen 2020; Villumsen *et al.* 2021). Included in wider analyses, radiocarbon dating from sites can be the starting point for new questions related to biographies of settlements, as demonstrated by several of the contributions to this volume.

There is an ever-increasing amount of archaeological data. There are many factors accounting for this, among them the Malta Convention in 1992 (see Løvschal 2016), the new museum law of 2002 in Denmark increasing possibilities for economic finances for sampling (Villumsen 2012), and an increasing number of excavations conducted prior to large infrastructure projects. Such data includes excavation data, natural historical data, digitized museum collections and digitized historical maps. This

Figure 4. A variety of field methods employed in settlement archaeology. A) Tore Gjeset Schjølberg taking measurements with a GPS instrument. B) Synne Rostad metal detecting. C) Kari Loe Hjelle, Syver Smukkestad and Ulf Fransson extracting a turf column for pollen samples. D) Philip Wood, Richard Macphail and Kari Loe Hjelle discussing sampling for micromorphology and pollen. E) Ulf Fransson with macrofossil samples. F) Ingvild Grønbeck sieving finds. G) Ellen Wijgård Randerz excavating animal bones. H) Synne Rostad sieving finds. I) Frode Iversen drawing. Photos: A, B, H, I: Åge Hojem. C, F: Ingrid Ystgaard. G: Marte Mokkelbost. D, E and collage: Magnar Mojaren Gran, all at NTNU University museum.

has created a new basis for analysis which is reflected in archaeological research. Big data has gained ground as an increasingly important element in historical, scientific, and contemporary research (Løvschal 2016). Big data provides opportunities for revealing patterns which would not be recognisable in smaller data sets. An increased volume of data, combined with methods and subjected to proper source criticism, generates higher statistical relevance. This can be seen in the use of radiocarbon data, where low precision data can be combined with high precision data in analyses directed towards discerning general patterns, for instance in demographic variations and developments (see below). Big data sets can be used to test hypotheses put forward in earlier research, and in turn open new possibilities of discovering patterns across time and place. Advanced GIS applications and mapping tools, combined with increasingly developed computer and statistical programs, provide new opportunities for analysis of large data sets (e.g., Ore and Uleberg 2019; Matsumoto and Uleberg 2021). Documentation of the excavations in Geographical Information Systems (GIS) increasingly contribute to the potential of complex analysis of the data from each site, also demonstrated in several of the contributions to this volume. There is one challenge that remains — to address the analytical potential that lies in the collection of GIS information from excavations within regions, and perhaps nations, into larger datasets (Matsumoto and Uleberg 2021).

The last few decades have also seen an increase in the private use of metal detectors. Amateur enthusiasts are providing large amounts of new data, although differences in legislation between the Scandinavian countries have an effect on how this new data develops (e.g., Fredriksen 2019). The emerging metal detector-driven data sets also contain new challenges for interpretations (e.g., Trier Christiansen 2017; Dahle *et al.* 2019; Sand-Eriksen *et al.* 2021).

Another reason for the increased amount of data is that museum collections are being digitized, and the data they contain is becoming much more available. There is also a growing interest in the digitization of older historical maps and historical texts, which together with the application of geophysical prospection, LiDAR and aerial photo-archeology, contribute to an ever-increasing digitization of text and map material (Løvschal 2016). New databases are constantly being set up that collect various archaeological, botanical and historical data, in ever larger and more comparable databases (e.g., Ore and Uleberg 2019; Abraham *et al.* 2021; Filzwieser and Eichert 2021; Bird *et al.* 2022; Kjesrud *et al.* this volume, see also sead.se/).

The use of non-invasive methods is increasingly important for understanding archaeological features, sites, and their larger contexts. Technological advances and an improved understanding of different landscape and soil characteristics continuously lead to a more precise application of methods used (Kristiansen *et al.* 2022; Stamnes *et al. in press*). While small archaeological features such as postholes are often elusive, even with high-resolution methods, features such as cooking pits and fireplaces have a relatively high detection rate (e.g., Gustavsen *et al.* 2020). Several Scandinavian examples indicate the location of Iron Age long houses and settlement structures (Smekalova *et al.* 2008; Trinks *et al.* 2010; Christiansen *et al.* 2016; Filzwieser *et al.* 2017; Tonning *et al.* 2020; Stamnes and Kiersnowski 2021), demonstrating a potential for identification and understanding of the prehistoric landscape.

Scientific data is increasingly used in archaeological studies to understand macro scale changes not easily detectable with traditional methods. This has been termed the 'third science revolution' in archaeology (Kristiansen 2014). New data is also emerging through increased use of scientific analyses in archaeology, such as isotope analysis for studying diet, settlement, and animal husbandry (e.g., Larsson *et al.* 2020; van der Sluis *et al.* 2020; Groot *et al.* 2021), genetics and aDNA (e.g., Margaryan *et al.* 2020). Radiocarbon dating has long been used as a proxy (indirect evidence) for human activity in Stone Age studies (e.g., Shennan *et al.* 2013; Timpson *et al.* 2014; Bird *et al.* 2020; Jørgensen 2020), but in recent years it has become more common in Bronze and Iron Age studies as well (e.g., Hamilton *et al.* 2015; Stockhammer *et al.* 2015; Solheim and Iversen 2019; Brunner *et al.* 2020; Hennius 2020). Several of the articles in this book use ^{14}C material and botanical analysis as big data to shed light on past settlement development and plant and landscape use (Meling this volume; Loftsgarden and Solheim this volume; Kjesrud *et al.* this volume). Other archaeometric methods increasingly used include portable X-Ray Fluorescence (pXRF) on pottery (Rødsrud and Fredriksen this volume), organic residue analysis/lipid analysis of such items as potsherds and iron production to examine the materials, their origin and manufacture (e.g., Rundberget *et al.* 2018; Holmqvist *et al.* 2019; Solvold 2019).

Developments in vegetation history move in a similar direction, where large data sets and new modeling tools enable the development of increasingly sophisticated models of functional divisions of houses, previous agricultural activities, land use and vegetational developments (e.g., Grabowski 2014; Mehl and Hjelle 2016; Mjærum 2020; Mortensen *et al.* 2021; Solheim 2021; Mjærum *et al.* 2022). Pollen analysis is used to study landscape use (e.g., Hjelle *et al.* 2016; Prøsch-Danielsen *et al.* 2020; Abraham *et al.* 2021; Mortensen 2021) and economic history (e.g., Izdebski *et al.* 2016) in larger regions and in long-term perspectives. There is also a growing interest in plant use beyond arable agriculture within archaeobotany (e.g., Mooney and Martín-Seijo 2021 with references; Kjesrud *et al.* this volume). Analysis of large charcoal assemblages from archaeological sites gives new insights into fuel acquisition strategies and woodland exploitation (e.g., Ballantyne *et al.* 2018; Mooney and Fyllingen 2020). Dendrochronological felling dates from historical construction timber in Europe has recently been analyzed as a geographical proxy to illuminate economic, demographic, and social conditions in early historic and medieval Europe (e.g., Ljungqvist *et al.* 2022). There is also an increased use of non-pollen palynomorphs (NPPs), which include fragments, diaspores, or whole organisms of very different taxonomical units such as fungi, algae, insects, and mosses. Use of NPPs is becoming an integral part of studies of land use and anthropogenic impact in Europe (e.g., Enevold *et al.* 2019 with references).

In recent decades, scientific analyses have become increasingly important in studies of demographic dynamics and the timing of societal crises. Pollen analysis (Lagerås *et al.* 2016) and dendrochronology (Büntgen *et al.* 2006; Thun and Svarva 2018) have been used to explore patterns of settlement expansion and abandonment. Widespread contamination of food and fodder by poisonous ergot (*Claviceps purpurea*) (e.g., Alm and Elvevåg 2013; Grzybowski *et al.* 2021) compounded by climatic cooling is proposed to have led to epidemic ergotism in the Migration period (Bondeson and Bondesson 2014). Geostatistical modelling is used to investigate the effect temperature changes may have had on cereal production and settlement pattern (Stamnes 2016). Sediment analyses, including geochemical and palynological analyses (e.g., ter Schure 2021; Bajard *et al.* 2022), and studies of insect outbreaks (e.g., Büntgen *et al.* 2009), are used to reconstruct past changes in temperature and agricultural practices.

While this volume maintains a focus on spatial and social organization of settlement sites in line with traditional research orientations, new research is broadening the scope of settlement studies by considering concepts of dwelling, biographies, and personhood (e.g., Beck 2017; Eriksen 2019; Dahl this volume). Synthesizing studies moving in these directions, however, also rely on additions of material and development and refinement of new and existing methods in field archaeology in general, and development-led archaeology in particular. Therefore, a continuous reflection on materials, methods and possibilities on all levels is necessary for the study of prehistoric settlement and landscape organization.

The contributions to this volume

A large portion of the papers in this volume present case studies, studying one or more aspects of settlement organization in farming societies. Many of the contributors represent regional museums, and this both reflects how cultural heritage management is organized in the Nordic countries and contributes to the regional perspectives that characterize this volume. Most papers are based on development-initiated heritage management excavation projects. These are the most common types of excavation in the Scandinavian countries, and they represent an important arena for the development and testing of many of the methods briefly discussed in this introduction.

The contributions to the volume are arranged according to chronology and geographical region. Chapters 2 – 8 discuss settlements in long-time perspectives and include case studies from the Early Iron Age from southeastern and eastern Norway and northern Jutland. Chapters 9 – 15 focus on social dynamics and relations between people, landscape, and settlements from the later parts of the Early Iron Age, through the Late Iron Age and the Middle Ages to the Renaissance, and include case studies from southern and central Norway, central Sweden as well as Finland and Denmark.

Niels Haue presents settlement sites from the Pre-Roman and Early Roman Iron Age in the Aalborg area in northern Jutland, Denmark, which is one of the most intensely excavated areas in southern Scandinavia. Haue's interpretation signifies that nucleated settlements and villages emerged on the transition from the Late Bronze Age to the Early Iron Age, and that they subsequently did not wander, but stayed in the same site for several generations, forming regular settlement mounds. The formation of villages correlated with a stricter regulation of land-use rights, and an increase in population. This contradicts earlier interpretations based on evolutionary principles and over-regional frameworks. ***Trond Meling*** presents a compilation of settlement and radiocarbon data from the last millennium BC in the fertile landscapes of southwestern Norway. An increase in settlement and population led to houses succeeding each other in stable farmsteads, in the most favorable areas as early as the Late Bronze Age. Rights to the use of meadows, pastures, and outfield areas were negotiated, in different points in the landscape, indicated by cooking pits, rock shelters and bog deposits. ***Satu Lindell***'s study is based on the settlement site of Madla in southwestern Norway, in one of the most favorable agricultural and most densely settled areas of Norway. She discusses the organization and re-organization of this settlement which demonstrates long continuity, although there was a decline in activity in the 6th century. ***Marie Ødegaard***, ***Lars Erik Gjerpe*** and ***Linnea Syversætre Johannessen*** compile the comprehensive results from one of Norway's hitherto largest excavated settlement sites from the Early Iron Age, at Dilling, southeastern Norway, mainly dating from c. 200 BC to AD 200. They argue that the settlement was organized in larger residential areas divided by "empty" areas without building remains. Furthermore, there was more than one individual farmstead within each residential area. A change in spatial organization around BC 200–150 is argued to relate to a shift in regulations of rights of possession of land – at the same time as a larger farm with a hall room appears.

The four first chapters, therefore, question the notion of the wandering settlements as a standard settlement pattern in southern Scandinavia in the last millennium BC, and bring nuance to this view through in-depth regional studies.

Lars Erik Gjerpe sets out to explore why the introduction of iron reaping tools was delayed until c. 200 BC in eastern Norway, despite iron technology being known in Scandinavia from c. 500 BC. While he argues that Pre-Roman Iron Age society was traditionalistic and reluctant to take advantage of new technology, he suggests that a potentially dramatic climatic event, believed to have taken place in 207 BC, could have spurred the choice of a new technological path and the use of iron reaping tools, to meet the challenges of climatic decline. ***Kjetil Loftsgarden*** and ***Steinar Solheim*** use radiocarbon dates as proxies for population dynamics by compiling and analyzing dates spanning from 1300 BC to AD 800 from a wide range of excavated sites in southeastern Norway. Their results indicate a long-lasting phase of population growth, beginning in the 5th century BC and lasting until the 5th century AD, followed by a decline in the 5th and 6th centuries. The study highlights and contextualises earlier developments indicated by local and regional case studies, including several studies presented in this volume. ***Karoline Kjesrud, Luka Natassja Olsen, Irene Teixidor-Toneu, Jade J. Sandstedt, Anneleen Kool and Linda Christiansen*** present an initial exploration of another large dataset currently under compilation: macrofossils from soil samples from decennia of development-led archaeological excavations in southeastern Norway. With a cross-disciplinary approach, they study plant use and human–nature interaction in the period c. 400 BC–AD 400. In their study of Augland, a pottery production site in southern Norway dating to AD 200–450/460, ***Christian Løchsen Rødsrud*** and ***Per Ditlef Fredriksen*** trace two different pottery craft traditions and explore how knowledge interaction enabled craftspeople to experiment with, learn and combine both traditions in one site and even in some vessels. Clay recipes of the two traditions, and especially the use of granite versus soapstone as tempering agents, prove to be crucial both for the understanding of the production technique, the function of the pots, the distribution networks of the raw material, and the knowledge networks.

These four papers employ varying methodological and theoretical insights to shed light not only on over-arching patterns of demography and human-nature interaction, but also on the social embeddedness of technological adaptation and innovation. Between them, they demonstrate the large knowledge potential that exists in a deeper examination of existing data from our museums' collections, and in learning from ensuing discussions and debate.

Ingrid Ystgaard analyzes activities and tasks performed in three neighboring Roman Iron Age farmsteads in Ørland, central Norway. Each farmstead provided their own subsistence production, while surplus production was coordinated between the farmsteads. Thus, they were parts of a larger community, even though their spatial organization indicates that they were independent units. ***Per Frölund'***s paper on the agrarian settlements at Bredåker and Berget near Old Uppsala, Sweden, explores how surplus products from agricultural settlements were paid to a central farm in a tributary system, as an acknowledgement of submission and a price for peace, security, and protection. In her paper, ***Barbro Dahl*** explores the relations between settlement and burials at Forsandmoen, a densely settled and well examined site in southwestern Norway. While the settlement was inhabited for more than 2000 years, the burials examined date between AD 150 and 550. Dahl finds that the relationship between the living and the dead was close in space during this period, and that a connection through time was established through the continuous re-use and maintenance of both the burial mounds and the buildings. In their paper on the recent excavations at an elite settlement at Ströja, Östergötland, Sweden, ***Björn Hjulström*** and ***Marta Lindeberg*** present an example of continuous settlement with central functions in the period c. AD 450–1000. The focus of the settlement remained a mead-hall, re-erected several times and functioning as a ritual center of a dispersed settlement, which saw a larger restructuring in c. AD 650, along with the introduction of a season-based marketplace.

Together, these four papers explore relations between the living, both in terms of symmetrical relations between neighboring farmsteads, and asymmetrical relations between farmsteads representing different levels on a social scale. The close spatial and temporal relations between the communities of the living and the dead add to our understanding of the social strategies of the living. Thus, social relations between communities on both sides of the division of death were of crucial importance to the spatial, economic, and social organization of settlements.

Tuuli Heinonen discusses village development in the Uusima region of southeastern Finland. This followed a different trajectory compared to the rest of southern Finland, where settlement development is more comparable to Swedish and Scandinavian developments. By interpreting placenames, Heinonen finds that settlement likely was initiated both by Swedish-speaking colonists and Finnish-speaking groups. Many settlements were initially established as single farms as early as in the Late Iron Age, and unified into village-like settlements during the 15th and 16th centuries. ***Louise Sønderborg*** states that Renaissance settlement sites are less known from the archaeological material. In Denmark one has, therefore, assumed that wooden, roof-supporting posts dug into the ground went out of use with a royal ban from AD 1554. However, excavations at Anebjerg in Jutland revealed that this construction principle was still being used in the 17th century, and that local building traditions and access to suitable building material were more important when it came to the choice of construction method than central regulations.

The two last papers in this book point towards important directions for further research on prehistoric and historic settlement organization in the Nordic countries. First, our scope must widen further, and consider settlement patterns in communities neighboring and interacting with the coastal Scandinavian settlement sites, both to the east in today's Finland, and to the inner and northern regions of the Scandinavian peninsula, where societies based on hunting and foraging left traces of settlements of which we still have very little knowledge. Second, we need to aim at broadening our insight into architectural, spatial, and social organization of settlements from the medieval and early historic periods.

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Early Iron Age village formation in Jutland, Denmark

Niels Haue

Abstract

Based on a case study near Aalborg in northern Jutland, Denmark, this paper presents current research on villages from the Early Iron Age. Within a relatively small area four Iron Age villages, representing a densely populated area, have been excavated in recent years. At the transition between the Bronze Age and the Iron Age, a shift in settlement patterns can be observed in the region. Large villages with ten or more contemporaneous farmsteads suddenly emerge, showing no gradual development from the single farms that dominated during the Bronze Age. The complexity of the Early Iron Age settlement patterns is emphasized by the internal layout and development of the four villages. The examples from the Aalborg area are, finally, compared with the settlement Grøntoft, in western Jutland, and a reinterpretation of the Grøntoft site is briefly presented. The settlement patterns presented in this paper contradict the evolutionary and gradual development that has dominated most previous interpretations of these Early Iron Age societies. The formation of the early villages is most likely related to the establishment of permanent field systems at the transition between the Bronze and Iron Age, and the changes within settlement structure must have further influenced landscape organization, and probably vice versa.

Keywords: settlement archaeology, Early Iron Age, Pre-Roman Iron Age, settlement mounds, tells

Introduction

Following the large-scale excavations of Iron Age villages in the 1960s and '70s, a unilinear evolutionary description has characterized the narratives concerning the emergence and further development of the village in Denmark – from small and scattered longhouses in the Bronze Age to the large farmsteads and villages of the Viking Age. However, recent excavations in northern Jutland contradict these narratives and imply that settlement development could follow different paths in the Iron Age. Compared to other areas in southern Scandinavia, differences in burial customs, settlement structure and architecture indicates that communities in the Limfjord area should be recognized as a regional group in Jutland (e.g., Haue 2011; Martens 2014). Settlement mounds and sites with thick cultural deposits are mainly seen in this area, and the use of turf as building material, the sunken floored longhouses and stone or timber-built cellars are other features that differentiate the area from other parts of Jutland.

This paper will present the preliminary results of large-scale settlement excavations that have been carried out in the last 20 years in the vicinity of Aalborg (see fig. 1). These excavations have revealed some of the largest and oldest villages in southern Scandinavia, but even within the limited study area of c. 10 km^2, the processes leading to these agglomerations of buildings seem differentiated.

The chronological framework for this study is limited to the Pre-Roman Iron Age and the Early Roman Iron Age. Generally, an abrupt shift in the layout of farms and villages and settlement organization can be observed in large parts of Jutland at the transition between Early and Late Roman period (c. 175 AD). Farms in the later period are larger and often consist of several buildings, while the longhouses in the Early Iron Age are typically equivalent to the farm (e.g., Ejstrud and Jensen 2000). The Early Iron Age in this paper includes the Pre-Roman (500–1 BC) and Early Roman Iron Age (AD 1–200) but excludes the Late Roman Iron Age (AD 200– 400).

Research of Early Iron Age Villages in Denmark

In the last 100 years, excavations of Iron Age settlements in Jutland have been numerous. In the early phase (1920–40s), well preserved longhouses (e.g., burnt houses) were excavated, but each house was excavated as an individual feature and the overall pattern of the village was often ignored (e.g., Kjær 1928; Hatt 1930, 1938; for further details see also Webley 2008). Many of the excavations were carried out in the northern parts of Jutland where large areas of heathland at that time were endangered by modern agriculture. The heathlands had not been ploughed for almost 2000 years and remains of longhouses and especially ancient field systems could still be observed and recorded. The longhouses in northern Jutland were east-west orientated and normally 12-18 metres long. A hearth, usually within the western part of the longhouse, indicates the living area, while the opposite end of the longhouse was used for stalling the animals. The walls were often turf-built, and one or two entrances were positioned in the middle of the building. The southern entrance was often accompanied by a well-built stone pavement indicating the main entrance to the house, while the northern entrance, in contrast, must be interpreted as the backdoor. The longhouse was the main building of the farm, and in the Pre-Roman Iron Age the presence of outbuildings is rare, while the frequency of outbuildings and the length of the longhouses increased during the Roman Iron Age. In the course of the Early Iron Age, then, the number of longhouses within each settlement came to equal the number of farms.

In the 1960s and 70s, the introduction and use of machines for topsoil stripping led to more comprehensive excavations, and postholes and ground plans of houses became the dominant feature at most archaeological sites. The longhouses were no longer seen as the main object of the dig; instead villages and the internal structure of the settlement came into focus. The longhouses were now divided into types and even entire villages could be fitted into typologies.

A neo-evolutionary framework was also part of the traditional description of the settlement development: a gradual clustering of the small scattered single-farms dominated the Early Pre-Roman Iron Age while larger farm-units and larger villages dominated the end of the Early Iron Age. The general picture has been heavily influenced by the large settlement excavations at Grøntoft (Becker 1966, 1971), Hodde (Hvass 1985), Nørre Snede and Vorbasse (Hvass 1983), and even though regional analyses at Zealand (Boye 2019), Fyn (Hansen 2016) and northern Jutland do not support this narrative, the gradual clustering and wandering villages have dominated the interpretation of settlement archaeology since the 1970s (e.g., Hamerow 2002). In recent years, a renewed interest in the regional differences of settlement organization can be seen within Danish archaeology as the general picture of each region is being challenged (Boye 2008; Runge 2009; Haue 2011; Hansen 2016). For further reading on the history of settlement archaeology in Denmark see e.g., Martens 2010a.

The emergence and concept of the Iron Age village and how to define it became widely discussed issues within Danish settlement archaeology in the 1980s and onwards (e.g., Becker 1982; Kaldal Mikkelsen 1999; Rindel 1999; Boye 2008; Lund 2009; see also Ødegaard and Ystgaard this volume; Heinonen this volume). Could a village consist of less than three longhouses? And how close should each farm be to each other to form a village? How could a village community be ascertained from the archaeological record? In this paper no further attempt will be made to define a village – instead, with regard to the spatial organization of settlements, a distinction will be made between single farms, clustered farms and villages. A village can be neatly ordered (for example, in rows) or include a more dispersed agglomeration of buildings where the distance to, and orientation of, each longhouse only show limited planning, if any.

The excavations in northern Jutland most often contradict the concept of wandering villages, but this has usually been neglected or ascribed to peculiar adaption to local conditions. In many locations the use of turf as building material, combined with a significant settlement continuity lasting hundreds of years, has resulted in the formation of artificial settlement mounds, or tells, with heights of 2 metres or more. The Thy area in particular, in the western part of the Limfjord region, is rich in closely spaced settlement mounds (Kaul 1999). The concept of the wandering village and the use of a teleological, unilinear evolutionary theory are inadequate to explain the settlement pattern in northern Jutland. A different explanation is called for.

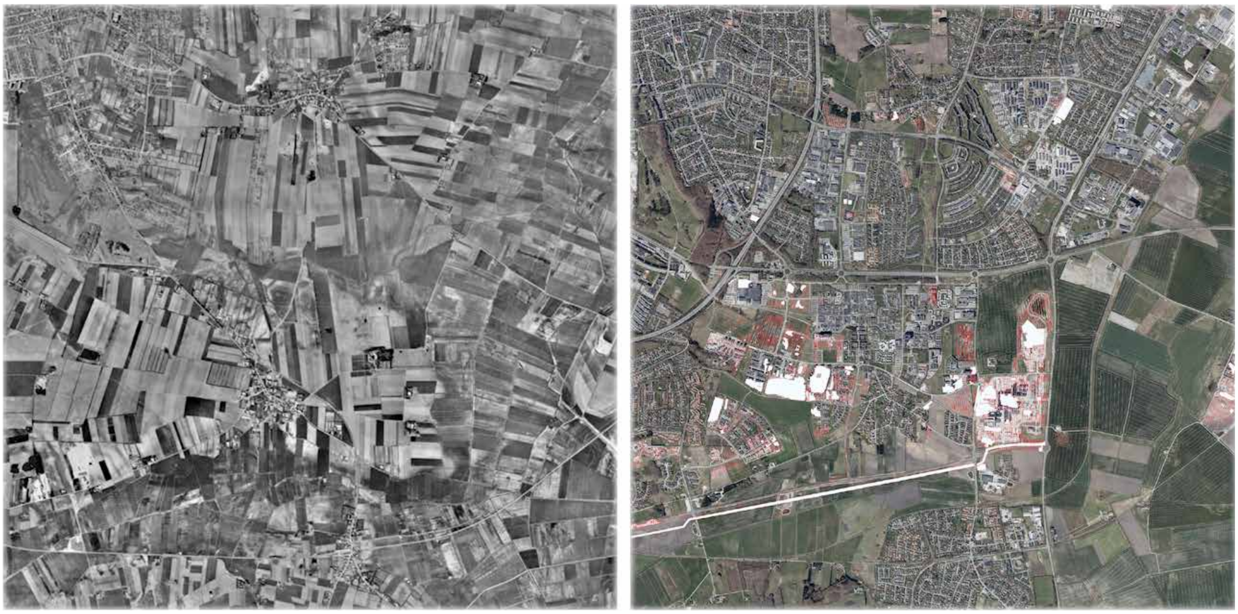


Figure 1. The urbanization around Sønder and Nørre Tranders illustrated by aerial photos from 1954 (left) and 2018 (right). On the latter, archaeological surveys are included (trial trenches and excavations). Illustration: Niels Haue. Base map: Geodatastyrelsen.

Iron Age villages in the Aalborg area

In the last 50 years, an area to the southeast of Aalborg has been subject to a large and ongoing urbanization, concentrated around the historical villages of Nørre Tranders and Sønder Tranders. Former agricultural land has been turned into roads and houses, and, prior to construction activities, large-scale archaeological excavations have been carried out over the last 20 years. Within an area of 1200 hectares, more than 300 hectares have been investigated with trial trenches, and 25 hectares of settlements have so far been excavated, providing a fantastic opportunity to study settlement development in a long perspective (see fig. 1). The study area presented here must be characterized as one of the most intensely excavated areas in southern Scandinavia.

Historical sources date the villages of Nørre Tranders and Sønder Tranders to medieval times, while nearby and recent excavations indicate an earlier date. In 2012 a small excavation close to the Romanesque church at Sønder Tranders revealed a silver hoard from the 10th century in close context to several pit houses and a few longhouses (Christiansen 2013, 2018). This modest excavation did not fully confirm the existence of a village at the site, and most likely the historical village surrounding the church is located on top of settlement layers from the late Germanic Iron Age or Early Viking Age. The numerous finds ascertained by the widespread use of metal detecting indicate that the geographical fixation of the historical village of Sønder Tranders should be dated to a later part of the 8th century (Christiansen 2018:120). In 2019–20 several pit houses and other settlement structures were located close to the Romanesque church at Nørre Tranders, which also indicates that the village should be dated to the Germanic Iron Age or Viking Age. The excavations at the site are still in progress and the number of structures and final dating of the settlement must await further analysis (Haue 2019).

The large-scale excavations have so far revealed four large settlements from the Early Iron Age. Three of the villages seem to date back to the transition between Bronze and Iron Age, while the fourth appears to be of a slightly later date. In the 1940s and ’50s a fifth settlement was destroyed by large gravel and chalk pits. The local museum undertook a brief investigation at the site and collected a few ceramic sherds. In 1982 renewed excavations nearby confirmed the existence of a large Iron Age settlement, but ongoing construction work destroyed the remains of the site. The finds and records of features indicate a village from the Early Iron Age of an unknown size (marked with a question mark in fig. 2).

Within this limited area, four or five coexisting villages appeared in the Pre-Roman Iron Age. Each settlement shows a remarkable continuity and each farm within the village was being rebuilt near the same spot as its predecessor. The pronounced continuity resulted in the accumulation of cultural layers of different thickness and at least two of the sites, Nørre Hedegård and Nørre Tranders, should be categorized as regular settlement mounds, where the

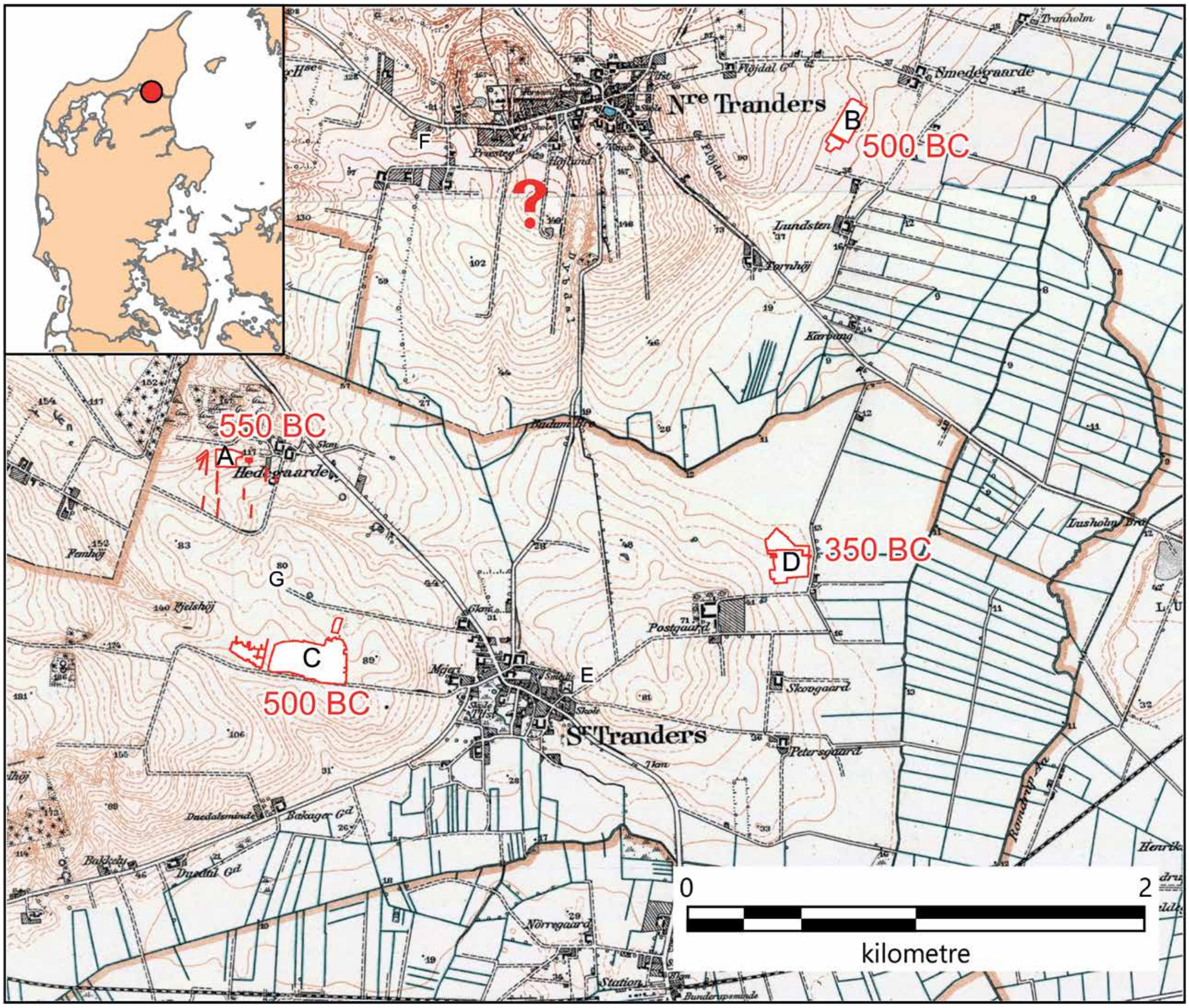


Figure 2. The location of villages dating to the Early Iron Age within the study area. The dates of the foundation of each settlement are marked. A) Nørre Hedegård. B) Nørre Tranders. C) Sønder Tranders and D) Postgården. The question mark symbolizes a fifth village from the Early Iron Age, but due to modern construction work and chalk pits, the exact date and extent of the village are unknown. Other sites mentioned in the text: E) silver hoard at Sønder Tranders, F) pit houses at Humlebakken and G) Pre-Roman Iron Age single farm at Trandersgård. Background map from the beginning of the 20th century with 5 feet contour lines. Illustration: Niels Haue. Base map: Geodatastyrelsen.

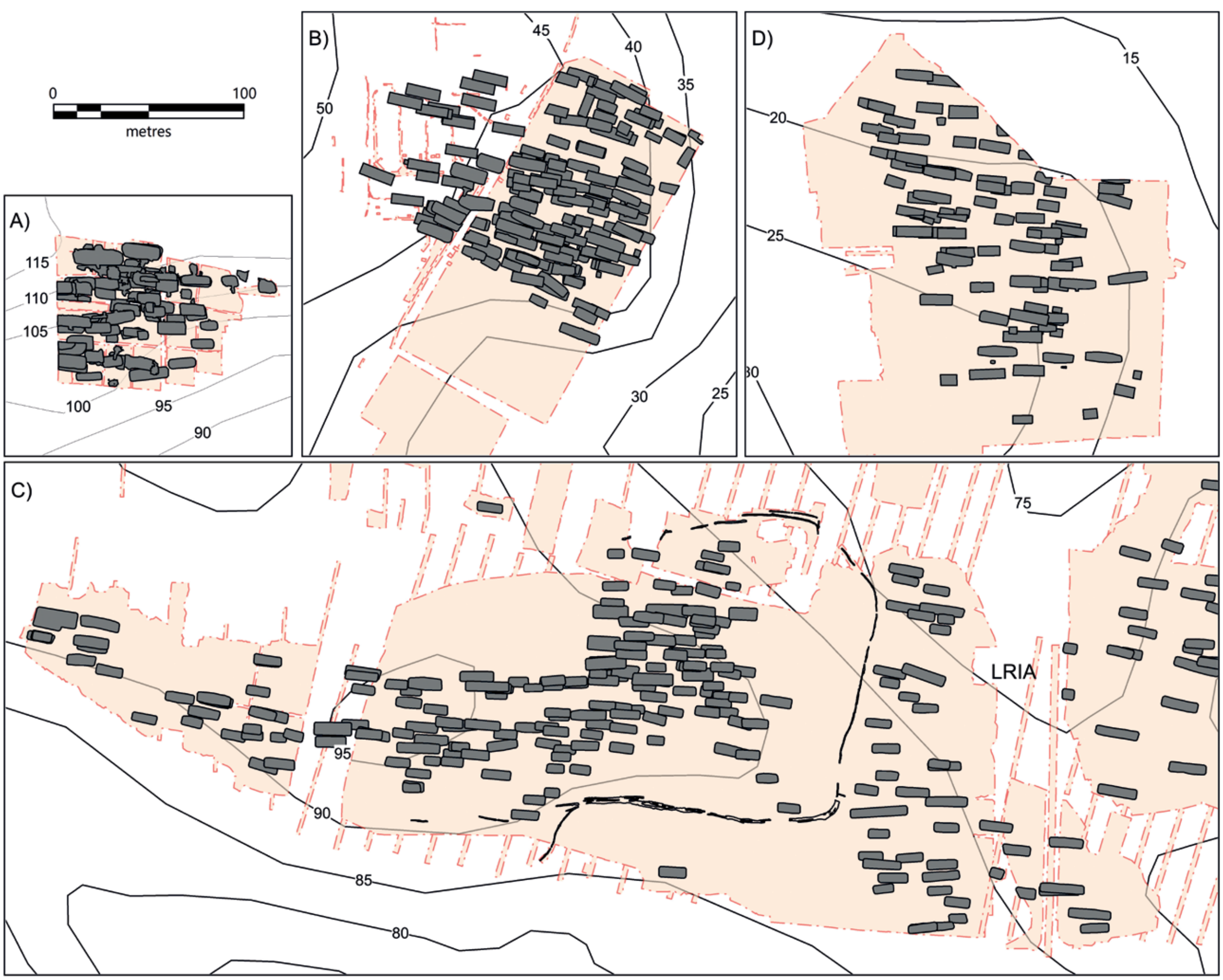
many years of continuity formed artificial mounds visible to the naked eye. Only the village at Nørre Hedegård has been fully published so far (Runge 2009), while the other three are in the process of publication. This paper gives a short and preliminary presentation of the sites and the settlement pattern within the Early Iron Age in the Aalborg area.

Nørre Hedegård

The village at Nørre Hedegård was excavated in 1998 preceding the construction of a large sports arena. The western and northernmost parts of the village have only been partly excavated and an estimated two-thirds of the one-hectare settlement has so far been examined (see fig. 4 a). The site is characterized by massive layers of sand that during the Early Iron Age covered fields and parts of the settlement (fig. 3). The sand drift was a persistent problem and during the latter part of the Pre-Roman Iron Age the settlement declined and finally vanished during the first century AD. The sand layers, combined with cultural layers containing stone pavements, ceramics and bones, made up an artificial mound of more than two metres in height. Nørre Hedegård was the first settlement mound excavated in the eastern part of the Limfjord area (Runge 2009).

Figure 3. Section through the settlement at Nørre Hedegård. At the bottom, ancient plough (ard) marks are present, while the white layers are remains of different house floors largely divided by sand drift. Photo: Historical Museum of Northern Jutland.

Figure 4. The excavated area at A) Nørre Hedegård, B) Nørre Tranders, C) Sønder Tranders and D) Postgården. Longhouses marked in grey. Since modern contour lines are biased by recent construction work, the contour lines here were measured in the 19th century and are at intervals of five feet. Photo: Historical Museum of Northern Jutland.



A total of 97 buildings were exposed, and based on an analysis of the stratigraphy and ceramics the c. 60 longhouses can be divided into ten village phases and two overall phases of drifting sand. The houses dating to the Early Pre-Roman Iron Age show an unformalized organisation in contrast to the younger phases that are organized in one or two rows (Runge 2009:155). The village was established around the transition between the Late Bronze Age and Early Iron Age and the first phase consists of c. ten longhouses. The settlement declined at the end of the 1st millennium BC and the final phase dating to the Early Roman Iron Age only contained two farms, but the existence of one or more contemporaneous farms further north outside the excavated area cannot be ruled out (Runge 2009:161).

Like the other Early Iron Age settlements in the Aalborg area, chalk rather than clay was used in constructing house floors and even as plaster material in the wattle and daub houses. For archaeologists the use of chalk has two pronounced advantages: it makes it easier to separate different cultural layers (as shown in fig. 3) and the preservation of archaeozoological material is superb (Kveiborg 2008; Hesel 2009).

Nørre Tranders

Next to the present-day village of Nørre Tranders there is an Iron Age site with a continuous settlement for c. 600 years resulting in a settlement mound covering an area of almost 2 hectares where the oldest houses were covered by younger houses forming a settlement mound of up to two metres in height. The cultural layers resulted in many well-preserved longhouses.

The eastern part of the settlement mound was excavated in 2000-01 and a total of 130 longhouses were uncovered. In 2015–16 several trenches to the west had delimited the settlement, but due to the placement of the trenches only a small number of partly excavated longhouses could be recorded (fig. 4 b). An estimate of 100–120 additional longhouses in the western part seems likely. In 2018 the construction of a road intersected the site and prior to the construction work archaeological fieldwork was carried out. Once more, several longhouses were recorded and a final estimate of a total of 200-250 Early Iron Age longhouses at Nørre Tranders can be made.

Wattle and daub characterize the older longhouses at the site, while the use of turf as building material was introduced during the Late Pre-Roman Iron Age. The houses from the Early Pre-Roman Iron Age show only moderate signs of repair, while interior posts of the later houses seem to have been replaced several times. In the central area of the site twelve phases of a farm could be recorded. According to the stratigraphy at the site and the associated find material it can be determined that each house had a limited time of use: for the older houses it seems not to exceed 30 years, while the youngest houses were in use for up to 40 or perhaps 50 years. These figures seem to correlate with other calculations of Iron Age longhouses in Jutland (Webley 2008). The lack of formalized boundaries between the farms limits the precise plan of the village phases and the exact number of interrelated farms. In the excavated part of the mound, the youngest phases date to the Early Roman Iron Age and counted ten-twelve contemporaneous farms, while the oldest phases contained six-eight farms. Including the numbers of the western, partly excavated area, the village at Nørre Tranders comprised 10–15 farms in the earliest Iron Age and after 500 years the number had increased with an additional five-ten farms. With up to 25 contemporaneous farms the village at Nørre Tranders is one the largest excavated Iron Age villages in south Scandinavia taking the number of farms as the yardstick, if not the size of the entire village.

Sønder Tranders

In the last 15 years, excavation has been carried out near present-day Sønder Tranders, and the fieldwork ended in late 2019. The results presented here should therefore be understood as preliminary. However, at the transition between the Bronze Age and the Iron Age a shift in settlement patterns can be observed in the area. According to ^{14}C-datings and finds of ceramics the Late Bronze Age is characterized by several dispersed longhouses, but in the earliest Iron Age a nucleated settlement was founded. The outline of this village can be described as a linear village, with longhouses placed in parallel rows, presumably distributed along both sides of a road. In the eastern part of the village a third and most likely even a fourth row of longhouses can be discerned. The many buildings are positioned on a low east-west orientated ridge of up to 30 m.a.s.l. The length of the Early Iron Age village is 400 metres and the width 50–80 metres, the village covering a total of 3.2 hectares. To the north, east and south a narrow ditch can be seen (fig. 4 c). Whether the ditch contained a wooden fence is still an open question, and the exact date of the ditch is also uncertain, but it is believed to have coexisted with at least one of the village phases. To the east of this ditch a village from the Late Roman Period and Early Germanic Iron Age has been excavated, showing a more scattered settlement compared to the earlier village (fig. 4 c). This contrasts with the other sites in this study where the successors of all three villages are missing. The excavated complex is interpreted as the predecessor of present-day Sønder Tranders and thereby displays 2500 years of village continuity.

The Early Iron Age village consisted of a total of c. 200 longhouses dating from the earliest Pre-Roman Iron Age and throughout the Early Roman Iron Age, thus showing a 700-year-long continuity. The preliminary analysis shows that the village was fully developed in the period 100 BC–AD 200, and at that time consisted of 12–15 contemporaneous farms placed in two or three rows, while the number of longhouses was lower in the older phases. Whether Sønder Tranders was founded as a village or was the result of a gradual clustering evolving from a few founding farms awaits further study. The number of longhouses seems to indicate a swift clustering of buildings, and most likely the site can be equated with the abrupt foundation of villages at Nørre Hedegård and Nørre Tranders. Perhaps the inhabitants from the neighbouring site Nørre Hedegård joined the villagers at Sønder Tranders at the end of the first millennium BC since Nørre Hedegård shows a decline and Sønder Tranders an increase in numbers of farms at that time. But for the moment such an interpretation must be tentative at best.

Even though the site is positioned less than 1 kilometer southeast of Nørre Hedegård, no sand drift was present to protect the archaeological remains. Instead, modern ploughing had destroyed the younger phases at the site and the cultural layer was modest, with a thickness of up to 40 cm.

Postgården

Except for the north-eastern corner, the village at Postgården was fully excavated in the years 2014–18, while the analysis of the finds, house plans, and the internal outline of the settlement is still ongoing. An area of 2.7 hectares of cultural layer contained stone pavements, hearths, floors and other features related to a total of 100 longhouses dating to the Pre-Roman and Early Roman Iron Age (fig. 4 d). The lifetime of the settlement can be estimated to around 500 years. The village is positioned less than 8 metres above present day sea-level and next to fertile meadows. Like the village at Sønder Tranders, the cultural layers were of limited depth, not exceeding 50 cm. In contrast to Sønder Tranders, modern ploughing had only had a limited impact on the prehistoric features, and many of the houses were well preserved with intact floors, hearths and stone pavements.

The placement of the longhouses at Postgården seems not as strict as the village plan from Sønder Tranders. Only a few longhouses at the site can be dated to the Early Pre-Roman Iron Age, and it seems likely that the village at Postgården developed from one or perhaps two farmsteads that were founded around 350 BC. By the end of the first millennium BC and during the Early Roman Iron Age, the village had at least 6–8 contemporaneous farms. The final phase of the settlement dates to the second half of the 2nd century AD, but, unlike Sønder Tranders, the successor to the village has so far not been discovered.

Villages in northern Jutland in the Early Iron Age

The case-study presented here shows a densely populated area where people at the transition between the Bronze and the Iron Age choose to live together in villages situated close to one another. Within the limited study area more than 500 longhouses have been excavated and, as the village at Sønder Tranders is the only fully excavated village, the exact number should probably be c. 600–700 longhouses, representing 40–55 contemporaneous farms. These are numbers that even exceed 17th century accounts of settlement in the region (King Christian V's matriculation of 1682/83).

The three villages at Nørre Hedegård, Sønder Tranders and Nørre Tranders each consisted of c. ten longhouses at the beginning of the Iron Age and must be described as regular villages. While the pattern at Nørre Hedegård and Nørre Tranders seems unstructured, the village at Sønder Tranders seems more planned, with longhouses placed in rows (fig. 4 c), but perhaps the "planning" of the village is due to the local topography, with houses positioned on an east-west orientated ridge. At both Nørre Tranders and Nørre Hedegård the layout of the village became more structured in later phases. Compared to Nørre Hedegård and Postgården, the two sites at Sønder Tranders and Nørre Tranders were richer in metal finds, which could indicate a hierarchization between the individual villages. Differences in the archaeozoological material also indicate different economical strategies, based on local landscape use, between each village. The settlement at Postgården differed from the rest, while the earliest phases only contained one or two longhouses it gradually increased in numbers during the Late Pre-Roman Iron Age. The layout of the village, however, never became as strict as in the other villages.

Excavations between the Early Iron Age villages have also revealed a few contemporaneous single farms. Should the inhabitants of these single farms be considered marginalized farmers at the fringe of the village community? Or perhaps completely outside the community? One of the single farms is placed right between the two villages of Nørre Hedegård and Sønder Tranders (Trandersgård in fig. 2). This single farm can be dated to the middle of the Pre-Roman Iron Age, and with a length exceeding 22 metres the longhouse can hardly be seen as the home of a poor farmer living outside the community. Compared to all longhouses in the entire Aalborg area, the size of this single farm stands out; perhaps the longhouse should be regarded as a chieftain's farm placed outside the village (Haue 2011).

The settlement pattern contradicts the evolutionary concept of villages slowly progressing through a gradual clustering from single farms to dispersed settlement to hamlets or villages. On the contrary, large villages with ten or more contemporaneous farmsteads suddenly emerged, showing no gradual development from the single farms that dominated during the Bronze Age. Only the Postgården village differs and might be seen as a colonization of marginal land during the Pre-Roman

Iron Age: a colonization that became successful and grew into a village. Early Pre-Roman villages have also been documented in the western part of the Limfjord region: Smedegård (Nielsen *et al.* 2020), Nr. Nordentoft (Mikkelsen 1994) and Øster-Helligsøgård (Mikkelsen 2000).

Grøntoft

At Grøntoft approximately 250 longhouses were uncovered during large-scale excavations carried out mainly in the 1960s (Becker 1966, 1971). The excavations covered 16 hectares, but they never revealed the complete outline of the settlement. In the southern part of the excavated area an enclosed village existed during two or three phases in the later part of the Pre-Roman Iron Age (fig. 5). Roughly 30 longhouses belong to different phases of this later village. Around 10–20 houses should be dated to the Late Bronze Age, while most of the house's date to the first 250 years of the Iron Age (Rindel 2010). Based on house typology, the settlement pattern has been described as a continuous clustering of longhouses that in the late 4th century BC formed a village community with approximately seven contemporaneous, but dispersed longhouses. The houses at Grøntoft in the 5th and 4th century BC form two settlements divided by a small stream and valley (Rindel 1999). A pit belt (an alignment of closely placed pits in bands) indicates, on the other hand, that the longhouses on both sides of the valley formed a unified settlement of 5–6 hectares (fig. 5), even though the belt could represent different phases and not a continuous feature (Rindel 2018). In the 3rd or early part of the 2nd century BC the fenced village was established and within an area of less than 0.3 hectares 11–13 farms were erected. The fence is seen as a sign of a structured and organized village in contrast to the less rigid settlement pattern that dominated in the Early Pre-Roman Iron Age.

But should the enclosed village at Grøntoft be seen as a logical outcome of the ongoing clustering within the settlement, or could the enclosure represent an unsuccessful attempt to endure as a village? Compared to the villages in northern Jutland, the enclosed area at Grøntoft only makes up 10% of the settled area at, for example, Sønder Tranders, while the older houses show a much more scattered distribution (fig. 5). If each longhouse is in use for one generation (c. 30 years), as indicated by the settlements in northern Jutland, a simple calculation implies that the remaining c. 200 longhouses at Grøntoft that date to the Early Pre-Roman Iron Age (a period of c. 250 years) on average could be divided into c. 24 contemporaneous farmsteads. Even if the lifetime of an Iron Age house is downgraded to 15 years and the occupancy period is extended to 300 years the calculation would result in c. ten contemporaneous farms.

These figures indicate that the settlement at Grøntoft should be regarded as a village as early as the earliest part of the Pre-Roman Iron Age. The number of longhouses implies that the settlement must be considered a large village, even though the distance between each longhouse could be 40 metres or more. As regards the numbers and distribution of longhouses, the Grøntoft settlement does not differ significantly from the other sites presented in this paper (e.g., compare figures 4. and 5.). The enclosed village consists of fewer longhouses than the "calculated village" from the Early Pre-Roman Iron Age and it could represent the decline of settlement rather than an evolutionary progress. There is however some uncertainty concerning this interpretation, as the existence of contemporary single farms surrounding the fenced village cannot be ruled out.

Settlement development in the Early Iron Age

The settlement pattern, at least from three of the northern examples, contradicts the view of a teleological development with villages slowly progressing through a gradual clustering from single farms to dispersed settlements to hamlets or villages. On the contrary, large villages with ten or more contemporaneous farmsteads suddenly emerged, showing an only limited development from the single farms that dominated during the Bronze Age. Most likely Grøntoft should be equivalent to the northern villages even though the distance between the individual farms might be longer.

In the Early Iron Age, the study area was a fertile region with vast coastal meadows in the lowlands and agrarian potential on the gently sloping hills. The ecological conditions for large villages were thereby present, and the 40–55 contemporaneous longhouses correspond to or even exceed the number of farms listed in historical records of the 17th century. This, however, does not explain the formation of villages.

Why did people choose to live in a village? Were the changes that led to the formation of villages a response to climatic, ecological or demographic factors, or should the emergence of villages be associated with a more violent period characterized by raids and plunder? Perhaps the need for protection and security could explain the enclosed Late Pre-Roman Iron Age village at Grøntoft, thereby explaining the development (or decline) from a dispersed to a clustered village. But no weapons or fortifications can be associated with the early villages in northern Jutland. Instead, a different explanation must be sought.

In the heathland of Jutland large areas of ancient field systems were recorded prior to modern cultivation (e.g., Hatt 1949). Some field systems, like Skørbæk Hede, covered more than 290 hectares, which is still thought to be a low estimate, bearing in mind the size of the original field systems (Vinter 2011:139). The date of the field systems is difficult to determine, but most dates fall into the Pre-Roman Iron Age – perhaps with an initial phase

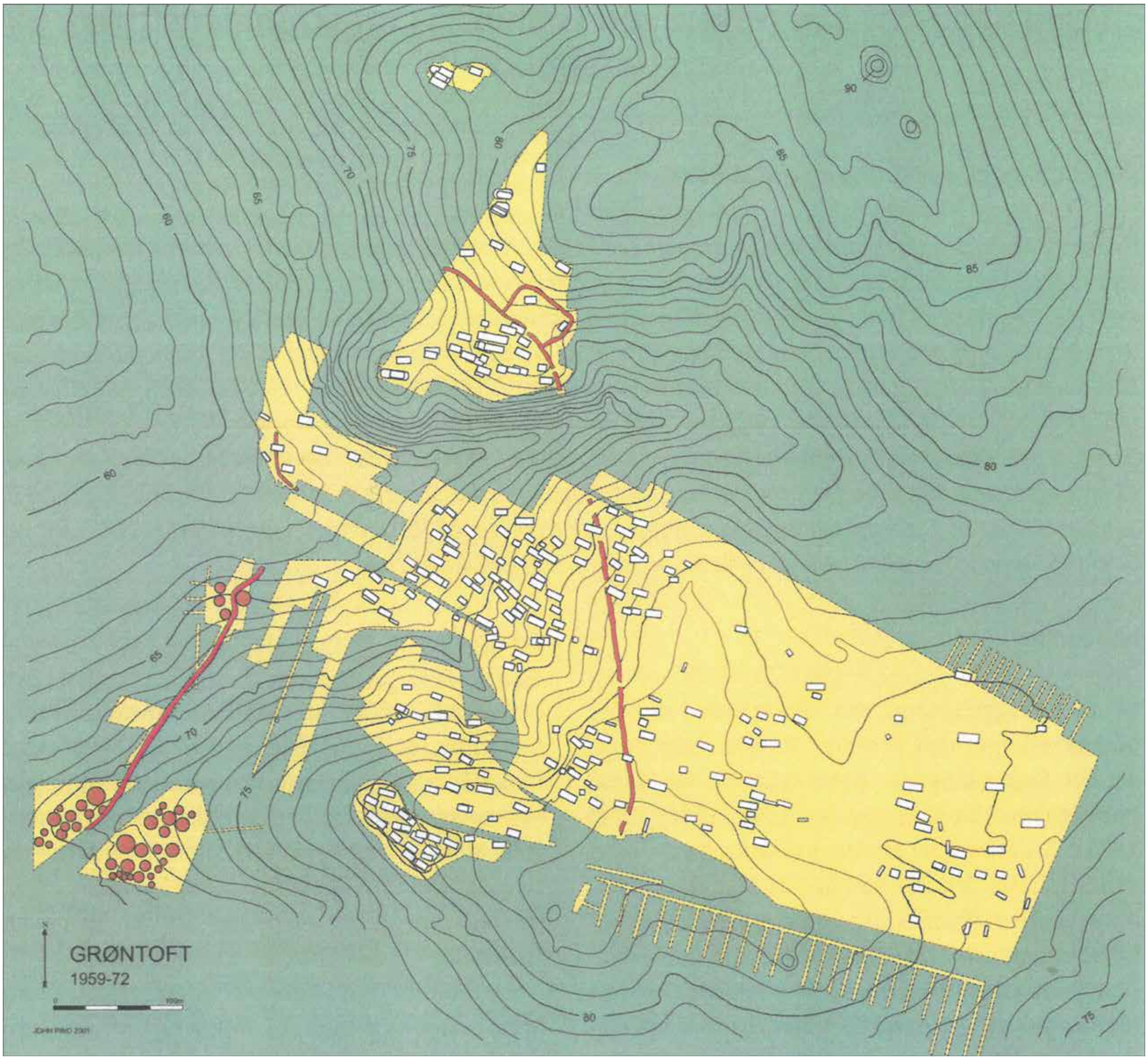


Figure 5. The settlement at Grøntoft. Illustration from Rindel 2011.

in the late Bronze Age (Nielsen 2000). The field systems undergo several changes, some fields being divided, others merging; and the overall system could be enlarged.

Based on pollen diagrams, the introduction of field systems is interpreted as a shift in landscape use with greater emphasis on formalized pasture. The systematization of fields at the transition between Bronze and Iron Age could have sown the seed of a similar division of the settlements, where a loose pattern is observable within the Early Pre-Roman Iron Age and a more formalized layout in the later phases (Vinter 2011). Perhaps the early Iron Age villages near Aalborg indicate that this change could materialize within one generation, or just a few generations. Whether the emergence of field systems and thereby village formation were influenced by the climatic changes occurring in the late Bronze Age, or by demographic pressure, or by both, cannot yet be determined.

The changes in settlement patterns also resulted in more fundamental changes within society. Analysis of the spatial layout of the sites does indicate an increase in hierarchization (Runge 2009; Martens 2010b; Haue 2011). A group of larger longhouses are present in the presented villages, but according to their numbers and sizes these should not be labelled chieftains' farms or the like. They just seem to be less ordinary than the ordinary longhouses. In the Late Pre-Roman Iron Age a clear hierarchization can be deduced within both graves and settlements, for example at Hedegård (Madsen 1996; Olesen 2019), Rosenholmvej (Møller-Jensen 2010; Olesen 2019) and Øksenhede (Haue 2012).

Concluding remarks

Earlier research of the settlements in the Early Pre-Roman Iron Age in Jutland gave the impression of the existence of dispersed, settled, egalitarian societies. This was a narrative that corresponded well with the poorly equipped cremation graves of the period. Recent large-scale excavations of settlements in densely populated areas in the early Iron Age enable us to recognise a different reality, which challenges the existing narrative of Early Iron Age Scandinavia.

The five examples presented in this paper make it difficult to point out a typical Early Iron Age settlement, and illustrate that no uniform explanation of the process of village formation in Jutland can be presented. Regional as well as local variations must be taken into account. This case study has revealed what appears to have been an abrupt and swift shift in settlement organisation in some areas, even though the existence of nearby single farms shows that some people chose to live apart. It is therefore impossible to describe a typical Early Iron Age settlement, although the earlier villages seem more loosely organized than the later. Changes in the landscape organization and distribution of land seems the most obvious explanation for the formation of the Early Iron Age villages. And even though these villages in northern Jutland is distinct from most of Jutland, the existence of other early Iron Age villages within other densely populated areas of the peninsula seems likely, as demonstrated by the Grøntoft example.

Even though the large excavations have revealed insight into each individual village there are new questions to ask concerning the wider community. How was the interaction between the neighbouring villages? Did the inhabitants live in peace and harmony, interbreed, exchange goods and livestock or should each village be seen as a competitor and rival to the others in a limited resource area? These questions will be subject to further analysis in the future.

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Settlement structure and landscape use in Southwest Norway in the last millennium BC

Trond Meling

Abstract

This study discusses settlement patterns and the interaction between farms during the last millennium BC in Rogaland. It is based on a collocation of 792 radiocarbon dates from 250 different sites retrieved through archaeological survey and excavation projects before 2020. Most of the dates are from the Pre-Roman Iron Age (500–1 BC), and the geographical distribution suggests a settlement expansion in the region around c. 500 BC. The settlement is dominated by single farms, but some areas have been densely populated, and in the northern part of the Jæren district the distance between each farmstead has not exceeded 500–700 metres during the Pre-Roman Iron Age. The distribution of radiocarbon dated sites and features within the landscape suggests that outfield areas were vital for subsistence. It is argued that the interaction and collaboration between different farms must have been extensive when exploiting resources in pastures and outfield areas, particularly in densely populated areas like the Jæren district.

Keywords: Southwest Norway, Pre-Roman Iron Age, farm structure, landscape, radiocarbon dates

Introduction

Since the end of the 1980s, when mechanical topsoil stripping became a frequently used archaeological method, the number of prehistoric agricultural settlements that have been found in Rogaland has increased considerably. Many of these settlements have produced radiocarbon dates from the Late Bronze Age (1100–500 BC) and Pre-Roman Iron Age (500–1 BC). This article is based on a collocation and an assessment of the context of all radiocarbon dates from this period in Rogaland.

The main objective is to discuss settlement patterns and farm organization in the last millennium BC. In Rogaland, settlement is dominated by single farms, but some areas were densely populated, suggesting a close coexisting settlement structure. The distribution of radiocarbon dates within the landscape also suggests that outfield areas were significant for the subsistence of the population. I will discuss land use and how the exploitation of resources within pastures and outfield areas influenced the spatial organisation of farms during the last millennium BC, and address the important question of how this affected the interaction and collaboration between different farms, especially in densely populated areas.

In *Complexity and dynamics. Settlement and landscape from the Bronze Age to the Renaissance in the Nordic Countries (1700 BC–AD 1600)*, M. Ødegaard and I. Ystgaard (eds.), pp. 41-52. Sidestone Press, Leiden.

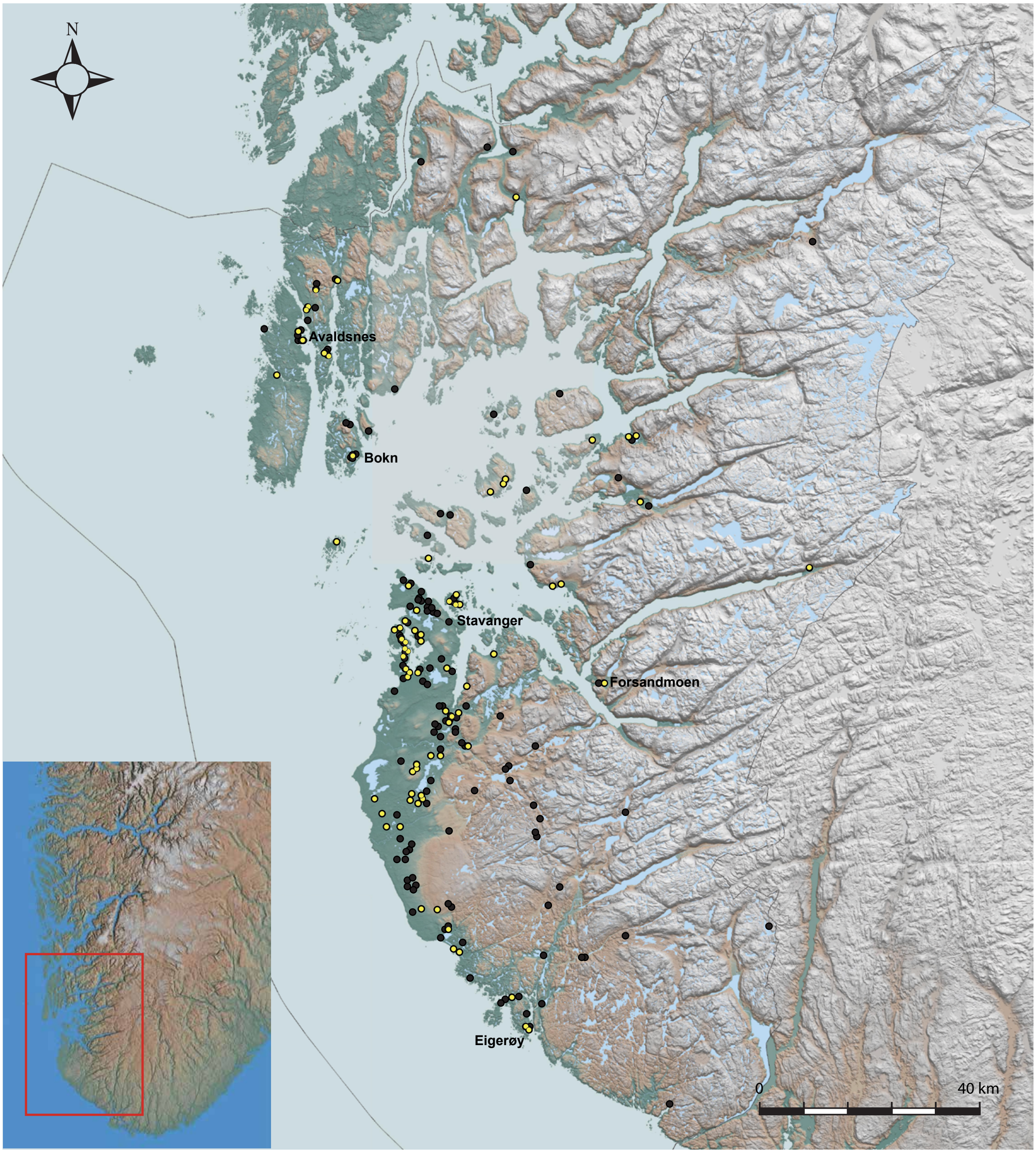

Figure 1. The distribution of sites from the last millennium BC in Rogaland, including place names mentioned in the article. The yellow dots marks sites which have radiocarbon dates from the Late Bronze Age (1000–500 BC). Illustration: Trond Meling.

Settlement and farmsteads in the last millennium BC

There is evidence of a distinct settlement expansion during the last millennium BC in several places along the coast of western Norway (e.g., Løken *et al.* 1996; Løken 1998a, 1998b; Myhre 2002; Diinhoff 2005a). Existing farm areas expanded, and pollen analyses show that new land was cleared to facilitate farming, grazing and settlement (Prøsch-Danielsen and Simonsen 2000; Overland and Hjelle 2009). At Forsandmoen in Rogaland (fig. 1), for instance, the settlement expanded from two farmsteads in the Early Bronze Age to at least six in the Late Bronze

Age (Løken *et al.* 1996:71). Houses became smaller in the last millennium BC, and even though there are some regional differences in how houses were constructed (Diinhoff 2005b), most of them have been 10–20 metres long and 5–6 metres wide (Løken 1998a, 1998b, 1999; Myhre 2002). Usually, they have traces of two opposite and recessed doors in the middle, dividing the house into separate rooms for animals and people. Most farmsteads have only one building, but some also have a second building for storage purposes or craft activities (Løken 1998b; Diinhoff 2005b).

The small houses from the Late Bronze Age and Pre-Roman Iron Age were most likely inhabited by family-like households (Myhre 2002; Björhem and Staaf 2006), and several researchers have argued that rights to arable land were related to how long a household remained as a unity (Gerritsen 1999:143–144; Herschend 2009:169–170; Bukkemoen 2015:113; Ødegaard *et al.* this volume). If the households changed, for instance by death or marriage, rights concerning the farm and the exploitation of the land had to be re-negotiated (Herschend 2009:170). Therefore, new farms were established, and existing farmsteads had to "re-emerge" when a new household took over. This is often referred to as a wandering (Gerritsen 1999:139; Holst 2010:170) or a random (Gjerpe 2017:189–190) settlement structure, and it forms a contrast to a more fixed settlement where the farmsteads were used and maintained for several generations, and where households achieved stronger rights to use of land (Gjerpe 2017:191–194). In parts of Sweden, the development of fixed farmsteads began already in the Late Bronze Age (Ullèn 1995; Borna-Ahlkvist 2002), while it first appears in the latter part of the Pre-Roman Iron Age in Norway (Bukkemoen 2015; Ystgaard 2019). In the late Pre-Roman Iron Age there are also examples of large houses with several entrances leading to different rooms (Løken 1998a; 2001), suggesting a more stratified society towards the end of the last millennium BC.

The transition from a random to a fixed farmstead is also related to the formation of the farm as a social and economic unit (Myhre 2002:121). However, the farm as a notion is disputed, and some archaeologists only use the term to describe farms dating back to the medieval period, while previous settlements are referred to as "agricultural settlements" (Grønnesby 2013:78). In this paper, traces of agricultural settlements from the last millennium BC are interpreted as remnants of farms and farmsteads – first, because most of these settlements are found within contemporary agrarian landscapes which include traces of farming and grazing, suggesting that cultivation and animal husbandry were the main reasons to settle, and, secondly, to distinguish the agricultural settlements (farms) from sites and places which were used occasionally and for short periods only.

It has been suggested that the settlement at Forsandmoen was organized as a village around 300 BC, since there were, at this time, eight different farmsteads in the area situated 30–90 metres apart (Løken *et al.* 1996:71). A village can be structured in different ways depending on time, place, and social organization, and it is difficult to create a simple or universal definition which is adequate for all types of villages (Sabo and Söderberg 2019:44). Most definitions, however, are based on quantitative (at least two or three adjacent farmsteads) and functional (collaboration between farmsteads) characteristics of the settlement (Sabo and Söderberg 2019). In this article, the extent of collaboration between different farms will be emphasised, but the discussion is based on the assumption that interaction took place between single farms in this region.

The radiocarbon dates from the last millennium BC

The dataset in this study consists of 792 radiocarbon dates (fig. 2). Around 80 % are from excavations, while the rest are from different kinds of surveys. Most of the dates are from publications and excavation/survey reports, but some are only accessible in the archives at the Museum of Archaeology, University of Stavanger and at the county Administration in Rogaland. The radiocarbon dates are sampled from 250 different archaeological sites, and nearly all are produced through development-led archaeology. Consequently, most sites are found along the coast, and in areas that are densely populated today, especially around Stavanger (fig. 1).

Several Scandinavian studies have used large datasets of radiocarbon dates as a proxy to investigate long-term changes and variations in agricultural practice, demography and human activity (e.g., Lagerås 2013; Solheim and Iversen 2019; Gundersen *et al* 2020; Mjærum 2020; Loftsgarden and Solheim this volume). Most of these studies handle a much wider time frame than the last millennium BC, and many have also modelled the radiocarbon data to avoid errors because of sampling bias (e.g Solheim and Iversen 2019; Mjærum 2020). In this study the radiocarbon dates have been calibrated in OxCal. v4.4.2, but the data has not been modelled, and the dates are only presented as an ordinary sum diagram (fig. 2). However, this diagram displays a general trend, and within the last millennium BC, the distribution of radiocarbon dates from Rogaland is similar to the sum diagrams from other parts of Scandinavia.

There has been a steady increase in the number of dates from the early part of the Late Bronze Age from Rogaland, and a small peak in the diagram is seen c. 800 BC (fig. 2). Between c. 750 BC and c. 550 BC the curve is rather flat (fig. 2). This is due to a plateau in the calibration curve, often referred to as the Hallstatt plateau, which makes it impossible to distinguish chronological sequences within

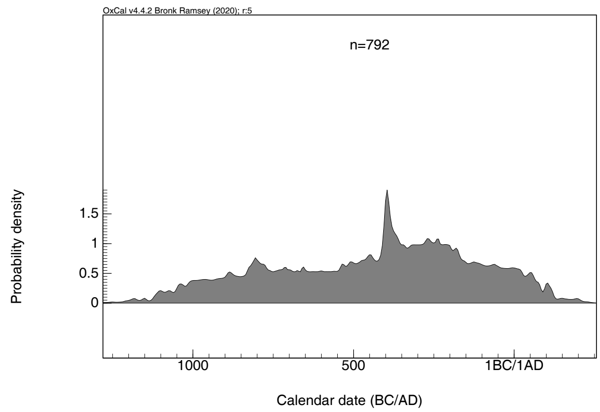

Figure 2. Sum diagram of 792 radiocarbon dates from the last millennium BC in Rogaland. The radiocarbon dates have been calibrated in OxCal v4.4.2.

this period (Ystgaard *et al* 2019:29). The most significant increase is in the Pre-Roman Iron Age, especially between c. 400 – 200 BC, while there is a subsequent small decrease in the number of dates after c. 200 BC (fig. 2).

The chronological distribution of radiocarbon dates from Rogaland suggests intensified human activity during the last millennium BC, particularly in the first half of the Pre-Roman Iron Age. This development is also demonstrated by the distribution of sites since the number of sites clearly increases, both geographically and within already settled areas, around 6–500 BC (fig. 1). Hence, there is reason to believe that both the number and the geographical distribution of radiocarbon dates, especially after c. 500 BC, reflect a period of expansion where new land was cleared to facilitate farming, grazing and the construction of settlements. A similar expansion in settlement and farming has also been demonstrated in the eastern part of Norway during this period (Gjerpe 2017; Mjærum 2020).

At 45 sites it has been possible to define buildings. These make up less than 20 % of all sites, but even so most radiocarbon dates seem to be from farms. Many of the sites are located in areas where farming conditions are good, and within most sites there are usually both a large number and a great variety of features, suggesting that they are traces of settlement.

Some radiocarbon dates, however, are from sites that do not appear to have been farms or dwellings. For instance, it is quite common to find cooking pits and fireplaces, either singly or in small clusters, from the Late Bronze Age and Pre-Roman Iron Age at Stone Age sites along the coast (e.g., Bang-Andersen 1981; Eilertsen and Redmond 2019; Sørskog 2020). Several rock shelters have also been occupied during this period, but only occasionally, and for short periods (Meling 2017a). Many of these rock shelters and Stone Age sites are situated at a distance from farmsteads, and they demonstrate that different parts of the landscape were exploited in the last millennium BC. Their location in the landscape also illustrates that outfield areas must be taken into consideration when discussing settlement structure and the spatial organisation of farms.

The farm and the surrounding landscape

To demonstrate to what extent outfield areas were related to farmsteads in the Pre-Roman Iron Age, three case studies from different parts of Rogaland will be presented. The case studies represent well documented areas, where several survey and excavation projects have taken place.

Laupland and Vågshaug, Bokn

In 2016–18 a large-scale survey and excavation project took place at Laupland and Vågshaug on Bokn (Sørskog 2018, 2020; Jensen 2020), an island situated in the northern part of the Boknafjord basin (fig. 1). The undulating landscape on Bokn, dominated by exposed bedrock, bogs, streams, and small lakes, is typical for the coastal region of southwest Norway. The land suitable for settlement and farming is somewhat limited, and within the investigated area the fields and the settlement were concentrated on a narrow strip of land at Laupland, surrounded by rocks and bogs (fig. 3). At Laupland, radiocarbon dates and botanical analysis indicate that farming started in the Late Neolithic, and that the area was continuously occupied until the medieval period. No complete houses from the last millennium BC were found, but radiocarbon dated postholes and fireplaces indicate that there have been at least four buildings at the site which have succeeded each other within the Pre-Roman Iron Age. Scattered in the surrounding landscape were several cooking pits, a cremation burial and three cairns, all contemporary with the settlement from the Pre-Roman Iron Age (fig. 3). The burial, which is of a young adult, was found in a small cairn situated on top of a rocky outcrop, about 250 metres from the settlement. The three cairns, which were found c. 750 metres from the settlement, have no clear indications of being burials, but they are interpreted as possible graves because of several construction details and the regular shape (Sørskog 2018:8). Nearly all the cooking pits were found at different Stone Age sites located between 150 metres and 800 metres from the settlement.

Gjeldestadvika, Eigerøy

A similar proximity between a settlement from the Pre-Roman Iron Age and contemporary cooking pits has also been found on the island of Eigerøy in the southern part of Rogaland (fig. 1). At a place called Gjellestadvika, several survey and excavation projects have been carried out since the early 1970s due to industrial construction work (e.g., Simonsen 1972; Bang-Andersen 1988; Bjørdal

Figure 3. The position of the settlement, fields and different structures from the Pre-Roman Iron Age at Laupland and Vågshaug on Bokn, plotted on an aerial photo from 1967. Photo: Kartverket. Illustration: Trond Meling.

and Dugstad 2014; Meling 2017a). Most excavations at Gjellestadvika have been related to Stone Age sites, but they also include a rock shelter and several gravemounds from the Roman Iron Age and the Migration Period (Bang-Andersen 1988). During surveys in 2013, archaeologists also found traces of farming and settlement dated to the Pre-Roman Iron Age (Bjørdal and Dugstad 2014), and, as on Bokn, these were situated within a limited area on high ground. The contemporary cooking pits, mostly found at Stone Age sites, are located between 100 and 300 metres from the settlement (fig 4). Pollen analyses demonstrate that the areas around the settlement were heathland and used for grazing during the Pre-Roman Iron Age (Simonsen 1972).

Avaldsnes, Karmøy

The third example is from Avaldsnes on Karmøy (fig. 1). Avaldsnes is probably best known as a place of aristocratic power and importance in the Late Roman Iron Age and onwards to the medieval period (Skre 2018). However, the agrarian settlement in the area was established in the Late Neolithic, and it expanded during the last millennium BC (Østmo and Bauer 2018). No traces of buildings have been found from this period, but radiocarbon dated features and the presence of thick cultivation layers suggest an increased settlement over time, especially in the latter part of the Pre-Roman Iron Age (Østmo and Bauer 2018:87). This assumption is supported by the existence of a similar and contemporary settlement at Velde (Dugstad 2011), only 500 metres southwest of Avaldsnes (fig. 5). Many of the cooking pits dated to the Pre-Roman Iron Age at Avaldsnes are found within or close to the fields (Østmo and Bauer 2018:87), but they also occur in the outskirts of the settled areas, along the seashore and on small islands close to land (fig. 5).

Discussion

Pollen analyses show that grass- and heathland dominated the coastal landscape of southwest Norway in the Pre-Roman Iron Age (Prøsch-Danielsen and Simonsen 2000), and many of the structures found in the proximity of the settlements on Bokn and Eigerøy and at Avladsnes probably relate to grazing, the tending of animals and the exploitation of hay-meadows. Some of the cooking pits, at least on Eigerøy and those close to the sea

Figure 4. The position of the settlement and cooking pits from the Pre-Roman Iron Age at Gjellestadvika, Eigerøy, plotted on an aerial photo from 1967. Photo: Kartverket. Illustration: Trond Meling.

Figure 5. The position of the settlement/fields and different structures from the Pre-Roman Iron Age at Avaldsnes and Velde, plotted on an aerial photo from 1964. Photo: Kartverket. Illustration: Trond Meling.

at Avaldsnes, could also be related to fishing and hunting of sea mammals. It is also likely that cooking pits were used during special occasions and gatherings, such as juridical and political meetings (Gjerpe 2001; Ødegaard 2019) and ritual activities (Narmo 1996; Henriksen 2005). The ritual use of the surrounding landscape is also illustrated by the burial on Bokn and by the discovery of four ard shares close to Avaldsnes. The ard shares were found in a bog about 1 kilometre west of Avaldsnes (fig. 5), and the location could indicate that the bog was situated at a territorial boundary (Zachrisson 2018:695–696).

The variety and number of structures in meadows and outfield areas suggest that resources within such landscapes were important for subsistence in the Pre-Roman Iron Age. There is also reason to believe that these resources had an influence on the location and organization of farms. In areas with a dense population, they would most likely also affect how adjacent farms interacted and coexisted.

The interaction between farms

The highest concentration of sites with radiocarbon dates from the last millennium BC in Rogaland is in the northern part of the Jæren district, especially around Hafrsfjord (fig. 6). Only small parts of this area are higher than 100 metres above sea level, and it is covered by thick and fertile Quaternary deposits which present favourable conditions for cultivation (Bergstrøm *et al.* 2010). Hafrsfjord is also one of few sheltered harbours along the coast of Jæren. So far, surveys and excavations have uncovered over 20 farm sites from the last millennium BC (fig. 6). These are situated on both sides of the fjord, but the majority are along the western part, particularly at Tjora and Sømme (Fyllingen and Armstrong 2012a; Eilertsen 2016; Meling 2017b, Lindell *et al.* 2018; Fyllingen 2019; Meling *et al.* 2020a).

Far from all sites around Hafrsfjord have been the subject of thorough excavations, but many have traces of thick cultivation layers and continuous agricultural settlements dating back to the Late Neolithic (e.g., Tansøy 2001; Fyllingen and Armstrong 2012a; Meling 2017b; Meling *et al.* 2020a). One example is a site at Sømme which had traces of twelve houses. The oldest house is dated to the transition between the Late Neolithic and Early Bronze Age, while the rest are from the last millennium BC (Meling 2017b; Meling *et al.* 2020a). Apart from a Late Bronze Age house, which was 20–25 metres long, all houses dated to the last millennium BC had a length of around twelve metres. The size indicates that the houses were occupied by family-like households, and both radiocarbon dates and the location within the site suggest that the houses succeeded each other over time. Because of massive aeolian activity the site was abandoned in the latter part of the Pre-Roman Iron Age, and the area was not re-occupied until the Late Iron Age.

The relocation of houses within a limited area at Sømme suggests a rather stable settlement structure at the site during the last millennium BC. Not all settlements around Hafrsfjord have the same long-lasting stability, and some were only used in the Pre-Roman Iron Age (e.g., Lindell *et al.* 2018; Meling *et al.* 2018; Lindell this volume). However, many of the pre-Roman settlements have multiple houses from this period (Bjørlo 2011; Meling *et al.* 2018; Fyllingen 2019). Pollen analysis also shows that agriculture expanded in the area at this time, and that permanent fields and hay-meadows were established (Fredh *et al.* 2018). This suggests that the settlement around Hafrsfjord increased during the Pre-Roman Iron Age, and that many farmsteads became fixed farms/settlements which were occupied for several generations. At Sømme this development seems to have taken place already in the Late Bronze Age (Meling *et al* 2020a).

The distance between each farmstead also supports the suggestion of a structural stability in the area, particularly in the Pre-Roman Iron Age when most farms were situated no more than 500 to 700 metres apart (fig. 6). In some places the distances were even less. One example is from Tjora where two farmsteads were situated 125 metres apart in the 4th century BC (Fyllingen 2019). Both farmsteads were located on a ridge but separated from each other by a marshy area. Another site is Varaberg, which has remnants of seven houses dated to the first half of the Pre-Roman Iron Age (Meling *et al.* 2018). Most of the houses have succeeded each other within this period, but radiocarbon dates and the position of the houses suggest that there might have been two separate farmsteads, only 20 metres apart, within the site in the second half of the 4th century BC.

Around Hafrsfjord there are several graves, ritual deposits, and sites with single or small clusters of cooking pits dated to the last millennium BC (fig. 6), and like the situation at Bokn, Eigerøy and Avaldsnes, many are located on the outskirts of the settlement or between different farmsteads. At Sømme, for instance, three cooking pits dated to 1000–600 BC have been recorded in an area which was used for pasture in the Late Bronze Age, and which was situated c. 500 metres from the nearest contemporary farmstead (Meling *et al.* 2020b). The same proximity between settlements and cooking pits is also recorded at Tjora and Myklebust, and at these sites some of the cooking pits were related to large boulders (Bell 2012; Fyllingen and Armstrong 2012b). At Tjora the distance between the boulder and the settlement was around 150 metres, suggesting that it was situated on the outskirts of a farmstead. The location and the size also suggest that the boulders had a ritual function (Bell 2012; Fyllingen and Armstrong 2012b), and close to the boulder at Tjora, on a rocky hilltop, was a grave field with at least seven cremation burials from the last millennium BC (Fyllingen and Armstrong 2012b). The grave field was

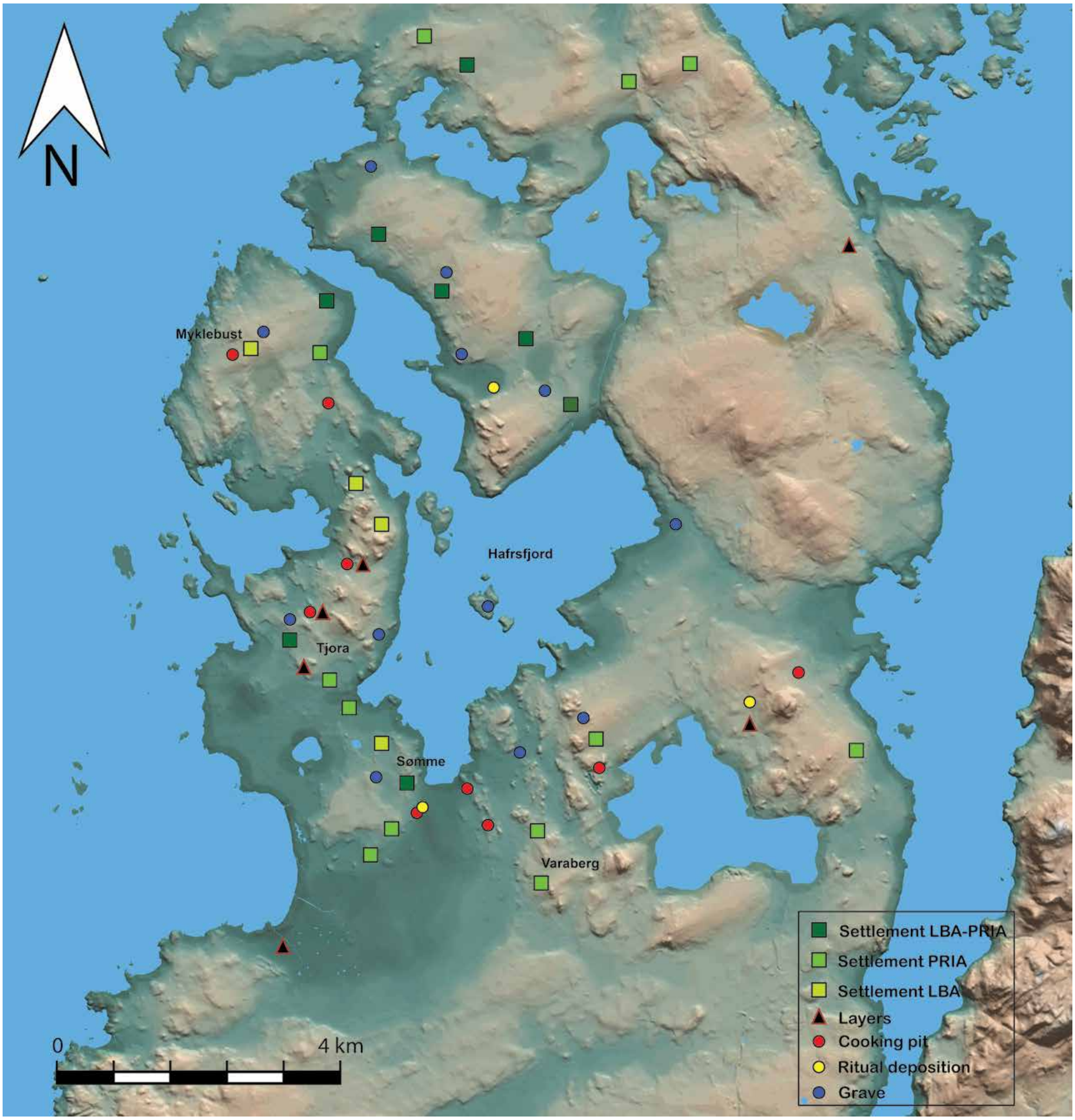

Figure 6. The distribution of settlements, graves, ritual depositions, and cooking pits from the last millennium BC around Hafrsfjord. Illustration: Trond Meling.

most likely related to one or several farms at Tjora, and the location could have been a boundary between different farms or landscapes. Ritual deposits in bogs may have had a similar function, since the great majority of such finds in Rogaland come from agrarian landscapes where the bogs were natural boundaries that differed significantly from the surroundings (Flesland 2014).

It has been argued that the settlement expansion in the Pre-Roman Iron Age must have influenced how, and to which extent, outfield areas were used, and that the exploitation of resources in the outfield was subject to common regulations (Björhem and Staaf 2006:192; Friman 2008:116; Holst 2010:158). Rock shelters may have functioned as important focal points when drawing up and monitoring such regulations (Meling 2017a), but this could also apply to large boulders, graves and cooking pits scattered in the landscape. Grazing was probably well organized in this period (Petersson 2004:231–232), and cooking pits in grazing areas, like those at Sømme, could represent places where herdsmen gathered and tended the animals (Prescott 1995;

Petersson 2001). It is also possible that such places were related to specific farm areas or farmsteads as part of a common regulation of pastures and outfield areas, and perhaps the rights to exploit the resources were associated with the household as a unit. If so, these rights had to be re-negotiated when the composition of the household changed, and the cooking pits could represent meeting places in the landscape where rights between neighbouring farms were settled. The meeting places probably changed over time in step with the settlement expansion, and this could explain why no large assemblages of cooking pits have been found within pastures and outfield areas around Hafrsfjord, which would suggest a regular use of the same place. Instead, the only finds of such features have been single or small clusters scattered in the landscape.

The large number of farms around Hafrsfjord, particularly in the Pre-Roman Iron Age, and the extensive exploitation of pastures and outfield areas, suggest a comprehensive collaboration and solidarity between different farms. The distance between some of the farmsteads was also very short, and some might characterise the settlement, at least in parts of the area, as a village. I am, however, reluctant to use this label since there are no fences linking the settlements together, and since most of the farms have been separated from each other by natural barriers like bogs, streams, and small lakes. Still, the need for working together, making agreements and negotiating rights was probably much more important for subsistence around Hafrsfjord, than in less densely populated areas of Rogaland. The result of this collaboration could even have been some measure of unity between farms where different households regarded themselves as a group with common interests. In my opinion, the settlement around Hafrsfjord demonstrates that single farms could have a high degree of interaction without being organized as a village.

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Madla Sør in Rogaland, Southwest Norway – a settlement with long continuity?

Satu H. Lindell

Abstract
This article discusses the continuity/discontinuity in Iron Age settlements in Norway. The article presents finds and research at the site of Madla Sør in Stavanger, Rogaland county, Southwest Norway, and particularly the series of ^{14}C-datings from its features, and argues that they point towards a continuous occupation throughout the Iron Age. Traditionally such continuity has not been seen as likely in Norwegian settlements, but, as more and more sites with traces from both the Early and Late Iron Age have been excavated and studied, the likelihood of long continuity within a settlement starts to look stronger, especially in southwestern parts of the country. In many cases it is possible to observe continuity within and/or around a settlement, especially when larger areas have been excavated. The often subtle changes in the organisation of settlements and their placement in the landscape can reflect changes in society and landownership. Although such processes with respect to Iron Age settlements and societies are similar across large parts of Scandinavia, there are local variations in when and how they occur. Work at Madla Sør, with its comprehensive radiocarbon dating-series, amplified by other evidence from Rogaland county presented briefly in the article, contributes to the ongoing discussion of settlement continuity in Norway.

Keywords: Iron Age, settlements, house-sites, continuity, Rogaland

Introduction
In 2018, the Museum of Archaeology, University of Stavanger, excavated a settlement at the site of Madla Sør, Rogaland county, southwest Norway (fig. 1). Sixteen buildings and other settlement traces from the Bronze Age throughout the Iron Age and into the medieval period (c. 2000 BC–AD 1050) were excavated. With its possible continuity throughout the Iron Age the site differs from most Norwegian settlements, which are often in use either in Early or Late Iron Age and seldom in both. The radiocarbon dates from the site cover a long period, however: was it continuous occupation or were there different phases of abandonment and re-occupation? This will be studied based on the traces of buildings and their dates, and their spatial organisation at the site will be discussed.

Madla is located approximately 5 kilometres southwest of the city centre of Stavanger (fig. 1). The district of Madla forms a natural unit, both as a geographical area bounded by Hafrsfjord in the south and west, lakes Hålandsvatnet and Store Stokkavatnet to the north, and a river in the east, and as a historic administrative district. The district consists of four historic farms: Madla, Revheim, Nordre and Søre Sunde. The area has

In *Complexity and dynamics. Settlement and landscape from the Bronze Age to the Renaissance in the Nordic Countries (1700 BC–AD 1600)*, M. Ødegaard and I. Ystgaard (eds.), pp. 53-68. Sidestone Press, Leiden.

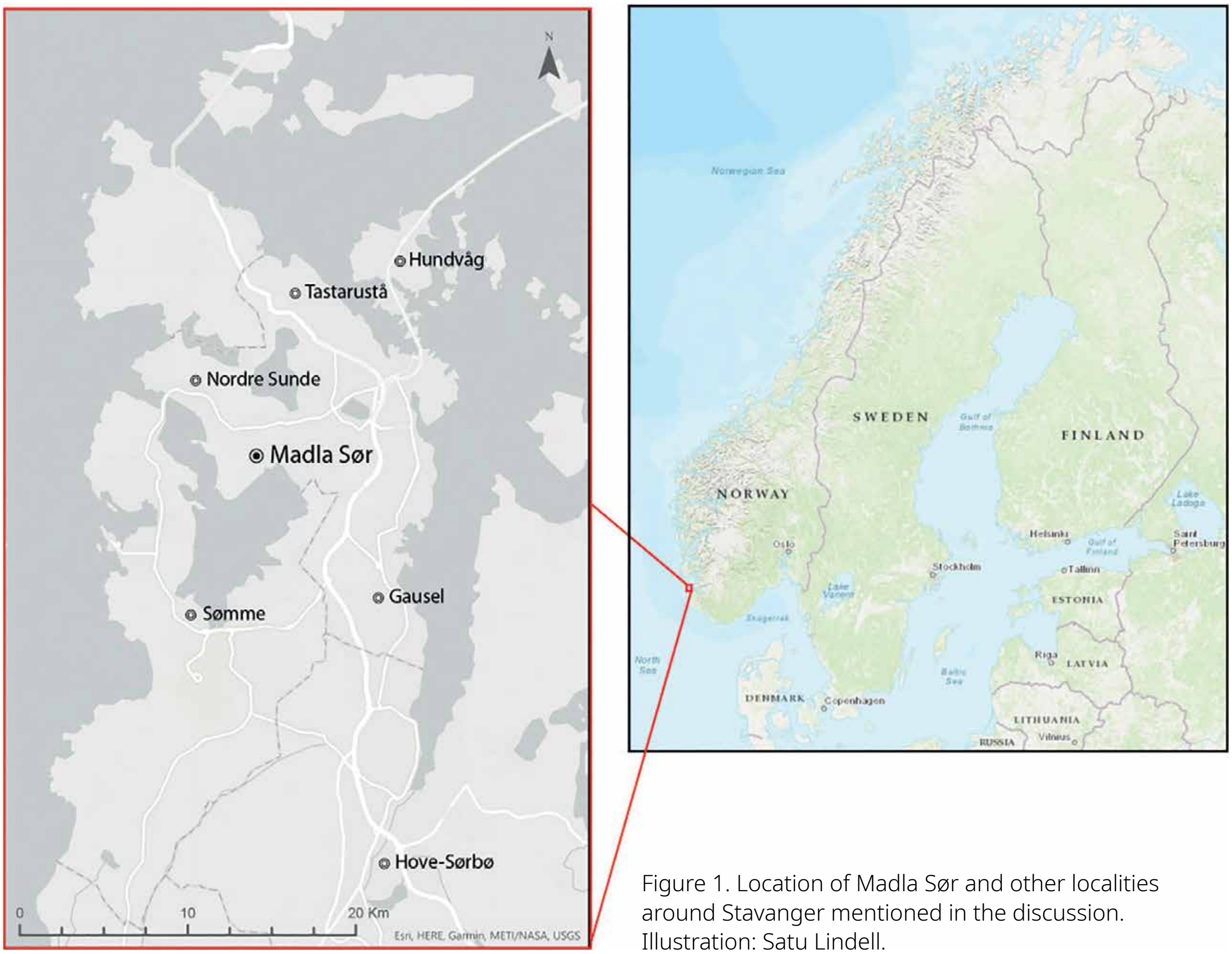


Figure 1. Location of Madla Sør and other localities around Stavanger mentioned in the discussion. Illustration: Satu Lindell.

good soil for cultivation (Soltvedt 2000; Høgestøl and Prøsch-Danielsen 2006) and historically rich farms, attested by extensive archaeological finds and sites from all time periods, and a small church in the medieval period (Lindanger 1983; Skadberg 1996). It is commonly seen in Norwegian archaeological material that even large settlements with continuity from the Late Neolithic/Early Bronze Age to the Early Iron Age are seemingly deserted in the end of Migration Period (c. 550 AD). Nonetheless, in Rogaland county and even in the district of Madla, there are other sites with signs of continuity from the Early (500 BC– AD 550) to Late (AD 550–1030) Iron Age. In the article, I will address the discussion of continuity or discontinuity of the site of Madla Sør related to other sites in southwestern Norway.

The research background: settlement continuity or discontinuity?

Continuity or not is a classic question in the research of settlement organisation in Norwegian archaeology. Continuity is often divided into different types, where *point continuity*, *place continuity* and *area continuity* are the most relevant for this study (Pilø 2005:7–8; Gjerpe 2017:130–151). Simplified, point continuity is used when buildings are repeatedly built on the same location, in place continuity when the buildings stay within the settlement but not in the same spot, while in area continuity a wider area is continuously in use, but the settlement/buildings move.

A common feature for the Late Neolithic, Bronze Age and Early Iron Age settlements in northwest Europe is a certain movement of the houses within a wider area. With intervals of one or two generations the houses were demolished, and new ones raised close by, often with the same infields. This phenomenon of “wandering settlements” seems to have been common in Norway until the Roman Iron Age, when complete settlements with all the main farm elements appear (Myhre 2004:45; but see also Meling this volume; Ødegaard et al. this volume). This type of settlement has area continuity due to its constant movement in the landscape. In Denmark the shift to more permanent settlements starts a bit earlier, in the Pre-Roman Iron Age. The change from the “wandering settlement” of the Bronze Age to (more) permanent settlement is thought to result from changes in landownership and inheritance, but also changes in cultivation methods and technologies (Webley 2008:40–44).

From the Roman Iron Age onwards settlements often had place continuity – in some cases also point continuity and they developed into farmyards with at least one multifunctional longhouse, and an infield-outfield system with fences (Myhre 2004:50–51). The restructuring of the agrarian landscape led to a new, more permanent settlement pattern with individual farms, multi-yard farms and possibly small villages developing. This change has often been explained with reference to population growth, but changes in the social and political organization of the society and developments in cultivation methods must also be considered (Myhre 2004:50–51).

The more permanent settlements of the Roman Iron Age/Migration Period seem to lose their point continuity in the mid-6th century when many of them were abandoned (see also Loftsgarden and Solheim this volume). Grave material and stray finds from both eastern and western Norway, indicate that the areas were inhabited in the Late Iron Age and early medieval period, nevertheless, relatively few buildings have been uncovered (Sørheim 2009:53–57; Gjerpe 2016:207). The reason for the "missing" Late Iron Age buildings and farms has caused debate, and explanations vary from the downturn from the AD 536 volcanic event, changes in building traditions and the fact that the buildings are located beneath the medieval and historic farms (e.g., Myhre 2004; Diinhoff 2009; Martens 2009; Sørheim 2009; Bjørdal 2016; Gjerpe 2016; Iversen 2016; Gundersen 2016; Rødsrud 2016; Løken 2020).

Until recently it has been almost an accepted truth that the Migration Period culture was considerably weakened after AD 550 by a general crisis leading to a near population-void in the Merovingian Period. With new excavations and research this hypothesis has been questioned, as more proof of continuity and even expansion of both settlements and agricultural activity form the 6th century to the Viking Age has been found (Myhre 2004:60–63).

Methods and sources

When evaluating the continuity/discontinuity of a settlement, it is quite natural to use a series of ^{14}C-datings from the archaeological features as the "backbone" of the study. Although widely used in archaeology, the ^{14}C-method has some challenges and limitations. One significant factor for errors is the "own age" of the sample material, mostly associated with long-lived species of trees, in which dates can be significantly older than the feature itself (Gjerpe 2008:85–94; Løken 2020:40). The ^{14}C-calibration curve also has flat plateaus, which may lead to inaccuracy (Gjerpe 2017:64; Ystgaard *et al.* 2019:28–30).

When it comes to dating archaeological features one of the main challenges is that charcoal can be redeposited in later structures. This problem is very clearly demonstrated in Madla Sør where two pieces of charred grain from the same posthole have been dated, one giving a result of 1700–1607 BC and the other AD 860–988 (see also Gustafson 2005:54–55; Diinhoff and Slinning 2013:65–75).

From Madla Sør we have calibrated 124 ^{14}C-dates using oxCal 4.4, with 2-sigma standard deviation (see tab. 1). The number of dates per house varies from 2 to 13; however, only 4 of the 12 buildings have less than 5 dates each. The longhouses 1, 2, 65 and 26 have 11–13 dates each and the rest 2–6 each. All the dated material is of short-lived species, such as birch or charred grains, mostly barley (Bjørdal and Lindell *in prep*.), which minimizes at least some uncertainties connected to the use of radiocarbon method. Samples collected from central fireplaces in the buildings were preferred for dating since they are considered less likely to suffer contamination – this applies to the samples themselves and to redeposition processes. In addition, charcoal probably represent the last use phase of the fireplace and thus the last phase of the building (Løken 2020:40–41).

In addition to the ^{14}C-material from the buildings I have evaluated the constructional details of the buildings with reference to previous research: for Bronze Age and Early Iron Age, Løken (1997, 2020); for Late Iron Age, Olsen (2013), Eriksen (2015) and Bjørdal (2016).

The site of Madla Sør

The site of Madla Sør is located on a small hill overlooking Hafrsfjord to the south. To the north the site is delimited by a peat bog, in the east by a stream running from the lake Store Stokkavatnet to the fjord, and towards west the landscape rises partly to another hill, and partly continues as open, relatively flat fields. There has been a Bronze Age mound within the area that was demolished in the 1860s, most likely located on the highest part of the field where no archaeological features were discovered during the excavation in 2018 (Bjørdal and Lindell *in prep*.).

During the excavation approximately 25.200 m^2 of farmland was stripped of topsoil and over 6000 archaeological features were uncovered, mostly postholes, fireplaces/cooking pits and miscellaneous pits (Bjørdal and Lindell *in prep*.). Based on the analysed macrofossils, pollen material and ^{14}C-dates from the agricultural layers, the cultivation in the area was first established around the transition from Late Neolithic to the Early Bronze Age and it was continuous from the Pre-Roman Iron Age onwards (Bjørdal and Lindell *in prep*.).

The excavation site consisted of four areas. In this study the focus will be on the largest one, field 1. Within this area the features form clear concentrations on the east and west of the hilltop, forming two main settlement areas (fig. 2). So far, a minimum of 16 buildings have been interpreted in field 1(fig. 3). Nine buildings were three-aisled longhouses, one (house 13) was a single-aisle building, and the rest

Beta no	House	Feature type	Material	Art	C14 2-sigma	Period *	BP	St.dev.
524242	1	Cooking pit	Grain	*Hordeum vulgare*	410-546 AD	MiP	1580	30
524244	1	Cooking pit	Charcoal	*Betula sp.*	86-242 AD	RIA	1840	30
524245	1	Cooking pit	Charcoal	*Alnus sp.*	248-391 AD	RIA	1720	30
524249	1	Pit	Charcoal	*Alnus sp.*	222-384 AD	RIA	1750	30
524253	1	Cooking pit	Charcoal	*Corylus avellana*	**133-264/**274-330 AD	RIA	1790	30
524257	1	Cooking pit	Charcoal	*Corylus/Alnus*	222-384 AD	RIA	1750	30
524261	1	Cooking pit	Charcoal	*Corylus avellana*	521-398 AD	RIA	1710	30
524263	1	Cooking pit	Charcoal	*Betula sp.*	251-398 AD	RIA	1710	30
524271	1	Cooking pit	Charcoal	*Alnus sp.*	325-430 AD	RIA/MiP	1660	30
524272	1	Cooking pit	Charcoal	*Betula sp.*	118-252 AD	RIA	1830	30
553865	1	Floor layer	Grain	*Hordeum vulgare var. vulgare*	0-130 AD	RIA	1940	30
524259	2	Cooking pit	Charcoal	*Corylus/Alnus*	118 BC-26 AD	PRIA/RIA	2040	30
524254	2	Cooking pit	Charcoal	*Alnus sp.*	124-258 AD	RIA	1820	30
524248	2	Cooking pit	Charcoal	*Corylus avellana*	137-334 AD	RIA	1780	30
553884	2	Ditch	Charcoal	*Corylus/Alnus*	206-345 AD	RIA	1770	30
524268	2	Cooking pit	Charcoal	*Alnus sp.*	211-383 AD	RIA	1760	30
524256	2	Cooking pit	Charcoal	*Betula sp.*	222-384 AD	RIA	1750	30
524269	2	Cooking pit	Charcoal	*Betula sp.*	325-430 AD	RIA/MiP	1660	30
524252	2	Cooking pit	Charcoal	*Salix/Populus*	**377-474/**484-535 AD	RIA/MiP	1630	30
524262	2	Cooking pit	Charcoal	*Betulaceae*	410-546 AD	MiP	1580	30
553879	2	Pit	Grain	*Cerealia*	410-546 AD	MiP	1580	30
524243	2	Cooking pit	Grain	*Hordeum vulgare*	765-895 AD	MerP/VA	1200	30
553883	2	Floor layer	Charcoal	*Betula* sp.	776-971 AD	VA	1150	30
553870	3	Posthole	Grain	*Cerealia*	106 BC-58 AD	PRIA/RIA	2020	30
524231	13	Posthole	Charcoal	*Salix/Populus*	**940-1021/**895-928 AD	VA	1070	30
524232	13	Posthole	Charcoal	*Corylus Avellana*	862-994 AD	VA	1120	30
524233	13	Posthole	Grain	*Cerealia*	887-1013 AD	VA	1100	30
553866	13	Posthole	Grain	*Hordeum vulgare var. Vulgare*	**940-1021/**895-928 AD	VA	1070	30
524238	14	Posthole	Charcoal	*Betula sp.*	776-971 AD	MerP/VA	1150	30
524239	14	Posthole	Charcoal	*Betula sp.*	962-1041 AD	VA	1030	30
529319	15	Posthole	Grain	*Hordeum vulgare*	768-900 AD	MerP/VA	1180	30
529320	15	Posthole	Grain	*Hordeum vulgare*	**940-1021/**895-928 AD	VA	1070	30
529321	15	Posthole	Grain	Cerealia fragmenter x2	950-1032 AD	VA	1040	30
529322	15	Posthole	Charcoal	*Betula* sp.	776-971 AD	MerP/VA	1150	30
529323	15	Posthole	Grain	*Hordeum vulgare*	892-1014 AD	VA	1090	30
529324	15	Posthole	Grain	*Hordeum vulgare*	968-1046 AD	VA	1020	30
529328	15	Pit	Charcoal	*Corylus avellana*	**259-107/358-279 BC**	PRIA	2160	30
529329	15	Pit	Charcoal	*Corylus avellana*	**259-107/358-279 BC**	PRIA	2160	30
529330	15	Pit	Charcoal	*Tilia* sp.	3639-3515 BC	EN	4760	30
529325	17	Posthole	Grain	*Hordeum vulgare* var. *vulgare*	962-1041 AD	VA	1030	30
529327	17	Posthole	Grain	*Hordeum vulgare*	428-599 AD	MiP	1530	30
529326	17	Posthole	Straw frag	Cerealia x2	862-994 AD	VA	1120	30

Table 1. List of ^{14}C-dates from Madla Sør. * EN=Early Neolithic, LN= Late Neolithic, EBA= Early Bronze Age, LBA= Late Bronze Age, PRIA= Pre Roman Iron Age, RIA= Roman Iron Age, MiP= Migration Period, MerP= Merovingian Period, VA= Viking Age, MP= Medieval Period. Illustration: S. Lindell.

Beta no	House	Feature type	Material	Art	C14 2-sigma	Period *	BP	St.dev.
553875	18	Posthole	Charcoal	*Betulaceae*	2031-1887 BC	LN	3600	30
524247	20	Cooking pit	Charcoal	*Betula sp.*	124-258 AD	RIA	1820	30
553880	20	Cooking pit	Charcoal	*Tilia* sp.	85-235 AD	RIA	1850	30
553882	20	Cooking pit	Charcoal	*Betula* sp.	66-222 AD	RIA	1880	30
524258	21	Layer	Charcoal	*Alnus sp.*	86-242 AD	RIA	1840	30
529294	23	Posthole	Charcoal	*Betula* sp.	776-971 AD	VA	1150	30
529293	23	Posthole	Nutshell	*Corylus avellana*	**133-264 AD** 274-330	RIA	1790	30
553877	23	Posthole	Charcoal	*Betula sp.*	860-988 AD	VA	1130	30
524237	23	Posthole	Charcoal	*Betula sp.*	1751-1619 BC	EBA	3390	30
529295	23	Posthole	Charcoal	*Betula* sp.	**1700-1607/**1742-1717 BC	EBA	3360	30
524225	26	Posthole	Grain	*Hordeum vulgare*	**774-906**/916-968 AD	MerP/VA	1160	30
524226	26	Posthole	Grain	*Hordeum vulgare*	768-900 AD	MerP/VA	1180	30
524227	26	Posthole	Grain	*Hordeum vulgare*	765-895 AD	MerP/VA	1200	30
524228	26	Posthole	Grain	*Hordeum vulgare*	**762-887/**692-748 AD	MerP/VA	1220	30
524229	26	Posthole	Grain	*Triicum aestivum*	**684-780/**787-876 AD	MerP/VA	1240	30
524230	26	Posthole	Grain	*Hordeum vulgare*	765-895 AD	MerP/VA	1200	30
524240	26	Fireplace	Grain	*Hordeum vulgare*	765-895 AD	MerP/VA	1200	30
529313	26	Posthole	Charcoal	*Maloideae*	**774-906/**916-968 AD	MerP/VA	1160	30
529314	26	Posthole	Charcoal	*Corylus avellana*	**774-906/**916-968 AD	MerP/VA	1160	30
529315	26	Posthole	Charcoal	*Corylus/Alnus*	661-774 AD	MerP	1280	30
529316	26	Posthole	Grain	*Hordeum vulgare*	768-900 AD	MerP/VA	1180	30
529317	26	Posthole	Charcoal	*Betula* sp.	1256-1306 AD	MP	710	30
529318	26	Posthole	Charcoal	*Betula* sp.	668-778 AD	MerP	1260	30
529297	41	Posthole	Charcoal	*Betula* sp.	1028-1184 AD	VA/MP	920	30
529308	41	Posthole	Charcoal	*Corylus avellana*	**1980-1868/**1847-1775 BC	LN/EBA	3560	30
529310	41	Posthole	Charcoal	*Betula* sp.	1643-1504 BC	EBA	3300	30
529311	41	Posthole	Charcoal	*Betula* sp.	878-1013 AD	VA	1110	30
529312	41	Posthole	Grain	*Hordeum vulgare* var. *vulgare*	943-1024 AD	VA	1060	30
529296	41	Posthole	Charcoal	Betulaceae	766-898 AD	VA	1190	30
529298	41	Posthole	Charcoal	*Betula* sp.	128-258 AD	RIA	1810	30
529307	41	Posthole	Charcoal	*Betula* sp.	**377-474/**484-53**5 AD**	RIA/MiP	1630	30
529309	41	Posthole	Charcoal	*Corylus/Alnus*	22-170 AD	RIA	1910	30
553858	41	Posthole	Grain	*Hordeum vulgare var. vulgare*	660-770 AD	MerP	1300	30
553859	41	Posthole	Grain	*Cerealia*	236-385 AD	RIA	1740	30
553864	44	Posthole	Grain	*Hordeum vulgare var. vulgare*	**590-405/**750-683 BC	PRIA	2430	30
553881	44	Posthole	Charcoal	*Betula* sp.	**651-543/797-731 BC**	YBA/PRIA	2530	30
524234	56	Posthole	Charcoal	*Betula sp.*	**774-906/**916-968 AD	MerP/VA	1160	30
524235	56	Posthole	Charcoal	*Betula sp.*	878-1013 AD	VA	1110	30
524236	56	Posthole	Charcoal	*Corylus/Alnus*	860-988 AD	VA	1130	30
524260	65	Cooking pit	Charcoal	*Alnus sp.*	892-1014 AD	VA	1090	30
529299	65	Posthole	Charcoal	*Betula* sp.	887-1013 AD	VA	1100	30
529300	65	Posthole	Charcoal	*Betulaceae*	**760-882/**688-751 AD	MerP	1230	30

Table 1. continued.

Beta no	House	Feature type	Material	Art	C14 2-sigma	Period *	BP	St.dev.
529301	65	Posthole	Grain	*Hordeum vulgare*	**940-1021/**895-928 AD	VA	1070	30
529302	65	Cooking pit	Charcoal	*Alnus* sp.	892-1014 AD	VA	1090	30
529303	65	Posthole	Charcoal	*Alnus* sp.	**938-1018/**894-930 AD	VA	1080	30
529304	65	Posthole	Charcoal	*Alnus* sp.	**854-981/**802-848 AD	VA	1140	30
529305	65	Posthole	Charcoal	*Alnus* sp.	950-1032 AD	VA	1040	30
529306	65	Posthole	Charcoal	*Alnus* sp.	943-1024 AD	VA	1060	30
553868	65	Stone layer	Grain	*Hordeum vulgare var. vulgare*	**595-411/**754-681 AD	LBA/PRIA	2450	30
553869	65	Cooking pit	Grain	*Avena*	768-900 AD	VA	1180	30
529331	66	Fireplace	Charcoal	*Salix/Populus*	118 BC-26 AD	PRIA/RIA	2040	30
529332	66	Fireplace	Charcoal	*Alnus* sp.	45 BC-77 AD	PRIA/RIA	1980	30
529333	66	Fireplace	Charcoal	*Corylus avellana*	80-230 AD	RIA	1860	30
529334	66	Cooking pit	Charcoal	*Betula* sp.	50-180 AD	RIA	1900	30
529335	66	Cooking pit	Charcoal	*Betula* sp.	22-170 AD	RIA	1910	30
529336	66	Stone structure	Charcoal	*Betula* sp.	45-85 AD	RIA	1970	30
529337	Activity	Layer	Charcoal	*Corylus/Alnus*	411-357 BC	PRIA	2310	30
529338	Activity	Layer	Charcoal	*Corylus avellana*	137-334 AD	RIA	1780	30
529339	Activity	Layer	Charcoal	*Corylus avellana*	**556-402/**748-685 BC	LBA/PRIA	2420	30
529340	Activity	Cooking pit	Charcoal	*Betula* sp.	106 BC-58 AD	PRIA/RIA	2020	30
529341	Activity	Pit	Charcoal	*Corylus/Alnus*	321-428 AD	RIA/MiP	1670	30
524265	E of h 65	Cooking pit	Charcoal	*Corylus avellana*	862-994 AD	VA	1120	30
524246	N of h 1	Cooking pit	Charcoal	*Betula sp.*	118-252 AD	RIA	1830	30
524251	N of h 44	Cooking pit	Charcoal	*Betula sp.*	1131-973 BC	EBA/LBA	2880	30
524264	Field 6	Cooking pit	Charcoal	*Corylus avellana*	80-230 AD	RIA	1860	30
524241	S of h 1	Cooking pit	Nutshell	*Corylus avellana*	**130-260/**279-326 AD	RIA	1800	30
524250	S of h 1	Cooking pit	Charcoal	*Betula sp.*	80-230 AD	RIA	1860	30
524255	S of h 1	Cooking pit	Charcoal	*Betula sp.*	251-398 AD	RIA	1710	30
524267	S of h 2	Cooking pit	Charcoal	*Betula sp.*	22-170 AD	RIA	1910	30
524270	S of h 2	Cooking pit	Charcoal	*Maloideae*	45 BC-85 AD	PRIA/RIA	1790	30
524274	S of h 2	Layer	Skjell	*Littorinidae*	332-576 AD	RIA-MerP	1990	30
524273	S of h 26	Layer	Skjell	*Cerastoderma edule*	355-590 AD	RIA-MerP	1970	30
524266	S of h 56	Cooking pit	Charcoal	*Alnus sp.*	197-47 BC	PRIA	2100	30
553862	Profile 1		Grain	*Hordeum*	768-900 AD	VA	1180	30
553861	Profile 1		Grain	*Avena*	321-428 AD	RIA/MiP	1670	30
553878	Profile 1		Charcoal	*Corylus avellana*	206-345 AD	RIA/MiP	1770	30
553873	Profile 2		Grain	*Hordeum vulgare var. vulgare*	360-156 AD	RIA	2170	30
553874	Profile 2		Charcoal	*Betulaceae*	1929-1753 BC	EBA	3520	30
553871	Profile 4		Grain	*Hordeum vulgare var. vulgare*	4-130 AD	RIA	1930	30
553863	Profile 5		Grain	*Avena*	206-345 AD	RIA	1770	30
553876	Profile 5		Charcoal	*Corylus avellana*	128-258 AD	RIA	1810	30
553867	Profile 6		Grain	*Hordeum*	375-203 AD	PRIA	2220	30

Table 1. continued.

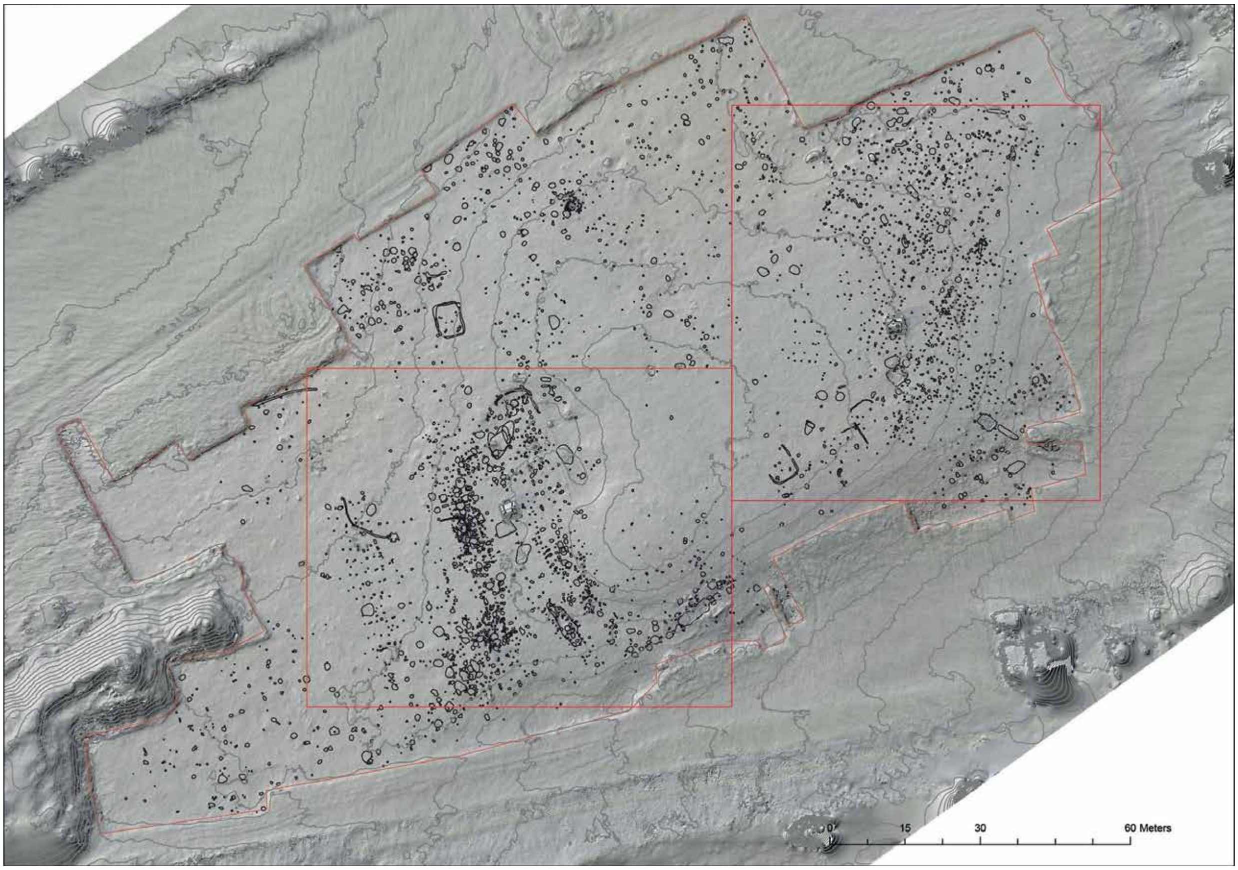


Figure 2. Overview of the features in field 1 with the settlement clusters marked. Illustration: Satu Lindell.

small buildings consisting of 4–6 posts and/or a wall ditch. Most of the small 4–6 posthole buildings were not excavated due to time constraints and are thus not dated (Bjørdal and Lindell *in prep*.).

Only two of the longhouses (houses 1 and 2) have clear central fireplaces/cooking pits. In the eastern cluster of buildings hardly any fireplaces/cooking pits were discovered. The situation is similar with house 26. This can partly be due to preservation but can also indicate chronological differences in building traditions, i.e., the structures connected to warmth/cooking may have been built on the surface rather than dug down into the subsoil. Only one longhouse, house 1, had a wall ditch (Bjørdal and Lindell *in prep*.).

At the bottom of the steepest incline of the hill, south of the hilltop, was a cluster of fireplaces and an activity/floor layer. A similar fireplace and activity layer complex has been found in Moi in Bygland, Agder county in southern Norway, where it has been interpreted as a kiln for secondary iron working (Reitan 2011:169–176), and a similar use in Madla Sør is not unlikely. Five ^{14}C-dates from the complex range from the start of the Pre-Roman Iron Age to the end of Roman Iron Age/start of Migration Period (556 BC – 428 AD). Other features include pits, ovens/possible kilns, fireplaces/cooking pits, and postholes that can belong to unrecognised buildings or fences (Bjørdal and Lindell *in prep*.). All ^{14}C-dates from the excavation are included in this article to give a more complete picture of the activity on site, and they are presented in table 1.

The buildings

As mentioned above, the building remains in the main excavation field concentrate in clusters in the west and east. In the western cluster the buildings' orientation is northwest/southeast, whereas in the eastern cluster they are mainly northeast/southwest oriented. This is probably due to the landscape, in which the buildings are placed along the height curves of the slope rather than across them (Bjørdal and Lindell *in prep*.). Here, I will present the buildings by cluster rather than chronologically for ease of reading.

In the western part of the settlement there are four buildings: 1, 2, 26 and 66 (fig. 4). Based on the ^{14}C-dates, the smallest one, house 66, is the oldest and dated to the Pre-Roman/Roman Iron Age. House 66 is oriented northwest/southeast and comprises two large fireplaces. It

Figure 3. Overview of the building interpretations. Illustration: Satu Lindell.

is considered as a workspace instead of a dwelling and its use should possibly be seen in connection with the cooking pit/activity area to the southeast. There was likely at least one more building from the same period south of house 2, but due to the density of postholes and other features it was not possible to identify any other buildings.

Buildings 1 and 2 date to the Roman Iron Age and Migration Period and have been repaired and/or rebuilt repeatedly during their use time. They are relatively northwest/southeast oriented, three-aisled longhouses with length of approximately 40 meters. The courtyard between the two buildings is partly stone covered. This kind of farm site formed by two parallel longhouses is somewhat typical for the period in Rogaland county (Myhre 2004:50–52). The ^{14}C-dates for these two buildings cover a long period: from approximately 50 BC to 900 AD. The oldest dates, from the Pre-Roman Iron Age, are likely to derive from earlier settlement activity and/or buildings. Both buildings have their main use-time approximately AD 200–400, and around AD 500 at the latest they went out of use. House 2 has three additional dates from central fireplaces to AD 800–900, which would indicate that the building may still have been standing and re-used in the Viking Age, or that a new building was erected in the same place. Construction details of the southern end of the building also support the later dates.

House 26 is an approximately 35 meter long three-aisled longhouse. It is parallel to the previous buildings and located west of house 2. It is dated to the Merovingian Period/Viking Age. One sample is dated to the medieval period, but this probably reflects later activity in the area and not the use of the building. The constructional details of the building, especially the more convex shape of its long walls, support the Viking Age date (Bjørdal 2016). The placement and orientation of the building make it plausible that it was erected while house 2 was still visible, forming again a courtyard between the buildings.

In the eastern part of the settlement there are nine buildings, mostly dating to the Merovingian Period and the Viking Age (fig. 5; tab. 1). This part of the field is complex with high density of features, thus errors in the house interpretations are more likely than in the western part. It is also very likely that there have been other, possibly older, buildings present that despite our vigorous efforts we have not managed to identify.

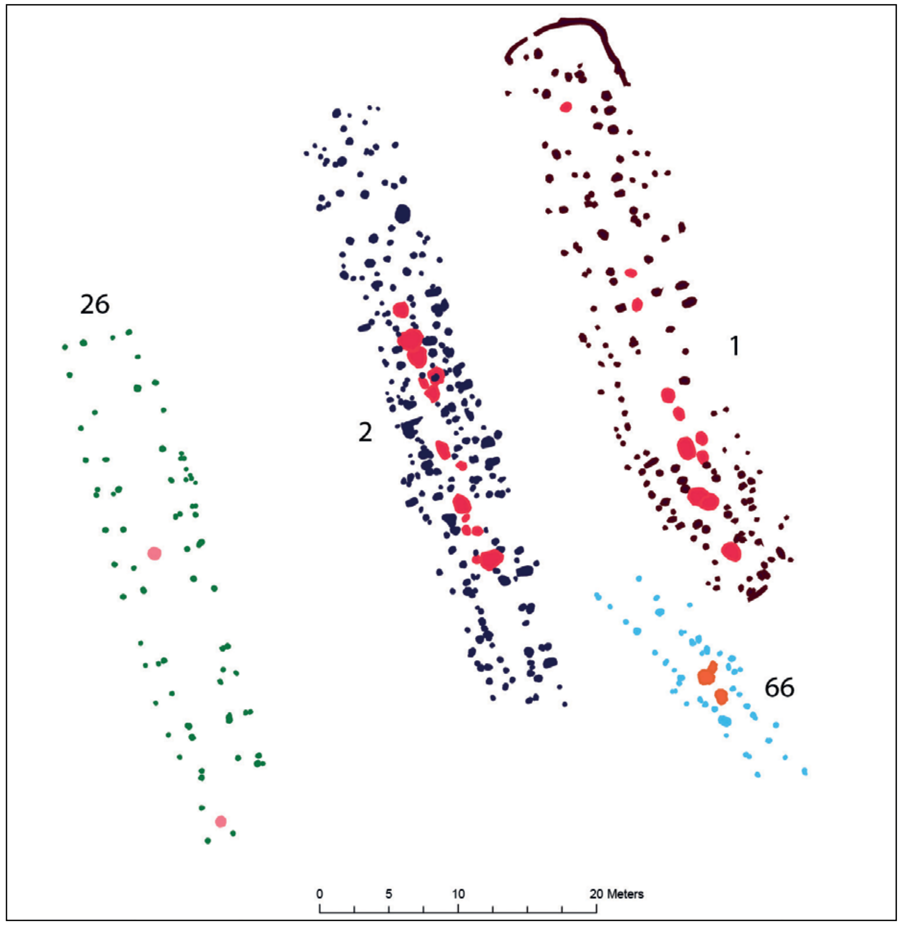
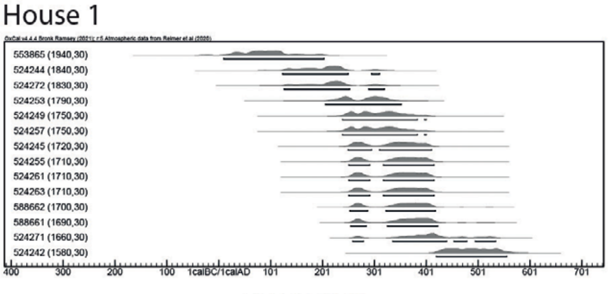
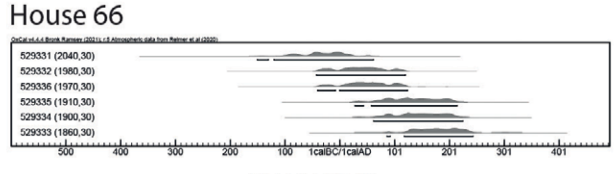


Figure 4. The house interpretations in the western cluster. Illustration: Satu Lindell.

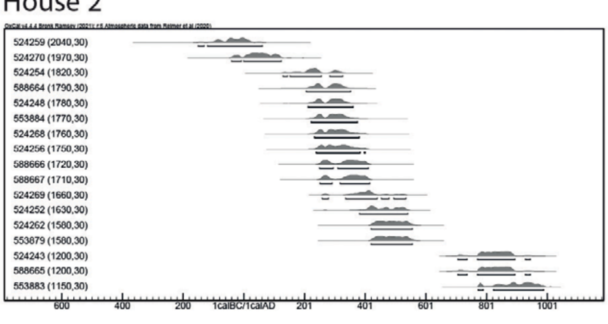
House 1



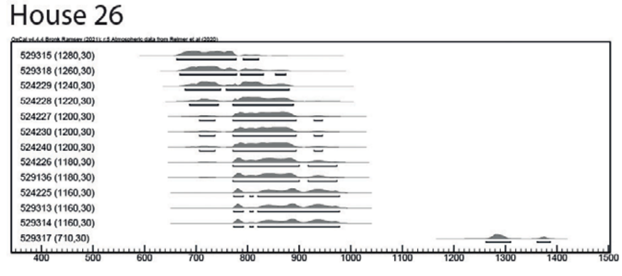
House 66



House 2



House 26



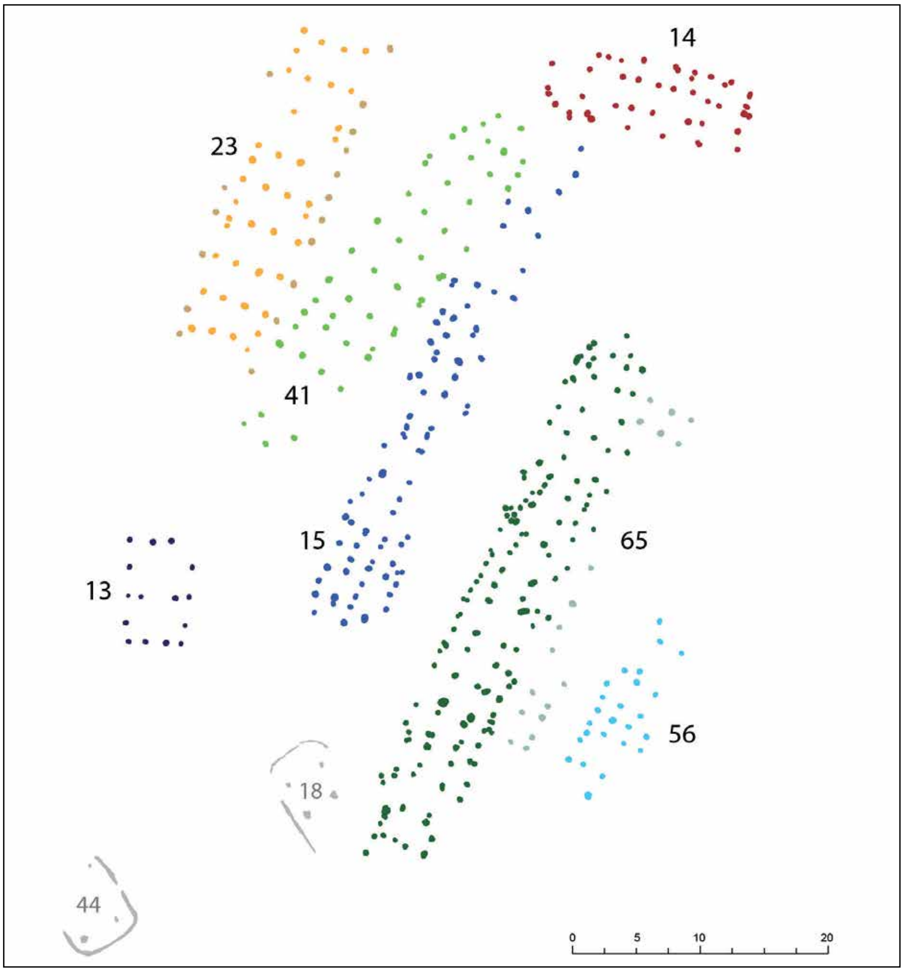
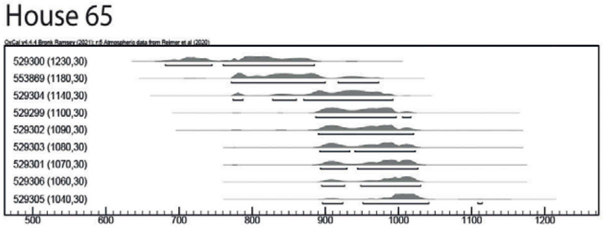
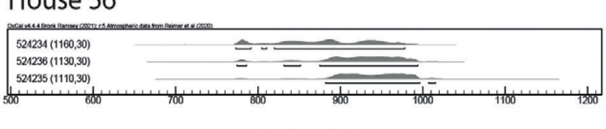


Figure 5. The house interpretations in the eastern cluster. Illustration: Satu Lindell.

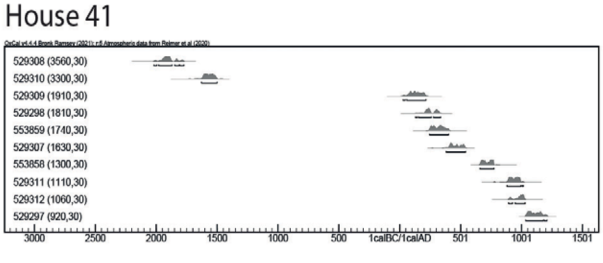
House 65



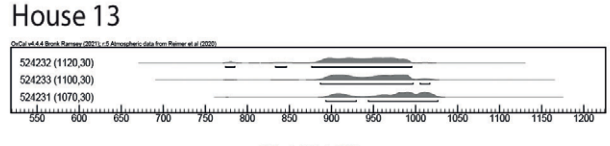
House 56



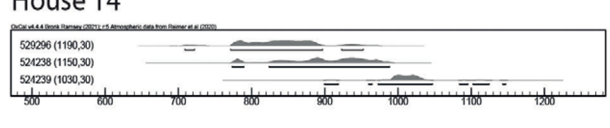
House 41



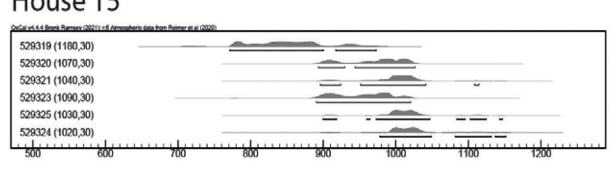
House 13



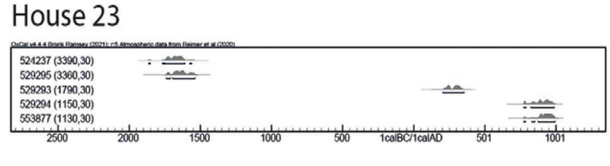
House 14



House 15



House 23



The biggest building is house 65, a 40-meter-long three-aisled longhouse dated to the Viking Age, with a possible older phase from the Merovingian Period (fig. 5). The building is northeast/southwest oriented and has signs of repairs/re-building.

Building 15 is parallel with building 65 and they may have formed a similar courtyard as the earlier houses 1 and 2 did. House 15 has been repaired and/or rebuilt. It has possibly been in use already in the Merovingian Period, but its main use-time is in the Viking Age.

Building 14 is also dated to the Merovingian period/Viking Age. It is a small three-aisled building with a nearly east/western orientation. Very similar buildings have been uncovered for example in Hjelle in Stryn, and Sandane in Gloppen, both in Vestland county, western Norway, where they have been interpreted as a transition to the timber framing constructions instead of the traditional post-built longhouses (Olsen 2013:156–157).

House 13 is a small one-aisled building with an inner wall dividing it into two rooms (fig. 5). It is dated to the Viking Age and its constructional details support the date. There are no fireplaces within the building, and it was probably a storage building.

House 56 is a small, poorly preserved three-aisled building (fig. 5) and is dated to the Viking Age.

Parts of houses 41 and 23 have a poor level of preservation. These two buildings have no clear signs of repairs and may have been one-phased. The southern end of both buildings has been destroyed by later land use and therefore the total length of these buildings is not known; however, it is at least 25 metres. The buildings are likely overlapping in this end and therefore cannot be contemporaneous. House 41 has a slightly different orientation from the main trend in this area and it cannot have been standing with house 15 either. Dating house 41 is somewhat challenging; it has two Bronze Age dates, four that place it to the Roman Iron Age, one to the Merovingian Period, two to the Viking Age and one to the medieval period (fig. 5; tab. 1). The oldest dates are likely to derive from older activity in the area. Based on the differing orientation and slight overlapping with other buildings the house was probably in use in the Roman Iron Age or the Merovingian Period/Early Viking Age.

House 23 also has variating dating results: two from the Bronze Age, one from the Roman Iron Age and two from the Viking Age. As the Late Neolithic/Early Bronze Age longhouses generally are two-aisled, the constructional characteristics support a later date of this building. As the orientation of the house is nearly identical with the other Viking Age buildings in the cluster it is likely that this building too belongs in that period. A near-identical building has been excavated in Tastarustå, approximately 4 kilometres north-northeast of Madla, and dated to AD 770–1020 (Armstrong and Kjedsen 2008). House 23 is most likely younger than house 41 and they can represent different phases of the same building.

Building 18 has two ^{14}C-dates to the Bronze Age; however, these do not overlap (2031–1887 BC and 1692–1536 BC). House 44 also has two ^{14}C-dates (590–405 BC and 651–543/797–731 BC) and is likely to be from the Pre-Roman Iron Age. Both are small, approximately 9x5,5 metres, and their interpretation is based mainly on the wall-ditch. Such small "U-shaped" buildings can be seen in the archaeological material in Rogaland throughout the Bronze and Iron Ages and cannot therefore be dated based on their construction (Løken 2020:103).

Summarized, in the earlier settlement phase, in the Roman Iron Age and Migration Period, the dwellings were in the west and only some activity took place in the eastern part. In the following phase, in the Merovingian Period and Viking Age, the main settlement activity had moved east, although at least one new longhouse was built in the western part as well. It is possible that one or both older houses (houses 1 and 2) were still standing and had a secondary use as storage space or workshop. Based on the very similar dates for the buildings in the eastern cluster, they must have been in use at least partly simultaneously, forming a larger farm unit with one or two longhouses surrounded by economic buildings. In the western part of the settlement, we can see point continuity with the longhouses 1 and 2 through their series of repairs and rebuilding. Here there is also clear place continuity at least from the Pre-Roman Iron Age to the end of Migration Period and again in the Viking Age. In the east we have traces of area continuity already from the Late Neolithic/Early Bronze Age onwards, place continuity possibly from Pre-Roman Iron Age, and point continuity latest from the Merovingian Period to the Viking Age.

Continuity or discontinuity?

The site of Madla Sør stands out from most of the Norwegian settlement material with its possible continuity throughout the Iron Age, as indicated by the ^{14}C datings. However, as figure 6 shows, there is a small gap in the dates in the first half of the 7th century, indicating either a possible brief abandonment with a reoccupation relatively soon after, or changes in the settlement structure. Although, as the dated samples are collected nearly exclusively from features within the most prominent buildings, it is possible that other buildings/features would have filled the gap in the dating series (Bjørdal and Lindell *in prep*.). As indicated by figure 6, the decrease starts already before the 6th century. This thus corresponds to the aforementioned settlement changes, reorganisation and abandonment that can be traced throughout southern Norway (e.g., Myhre 2004; Myhre 2013; Iversen 2016; Gundersen 2016; Rødsrud 2016; Loftsgarden and Solheim this volume).

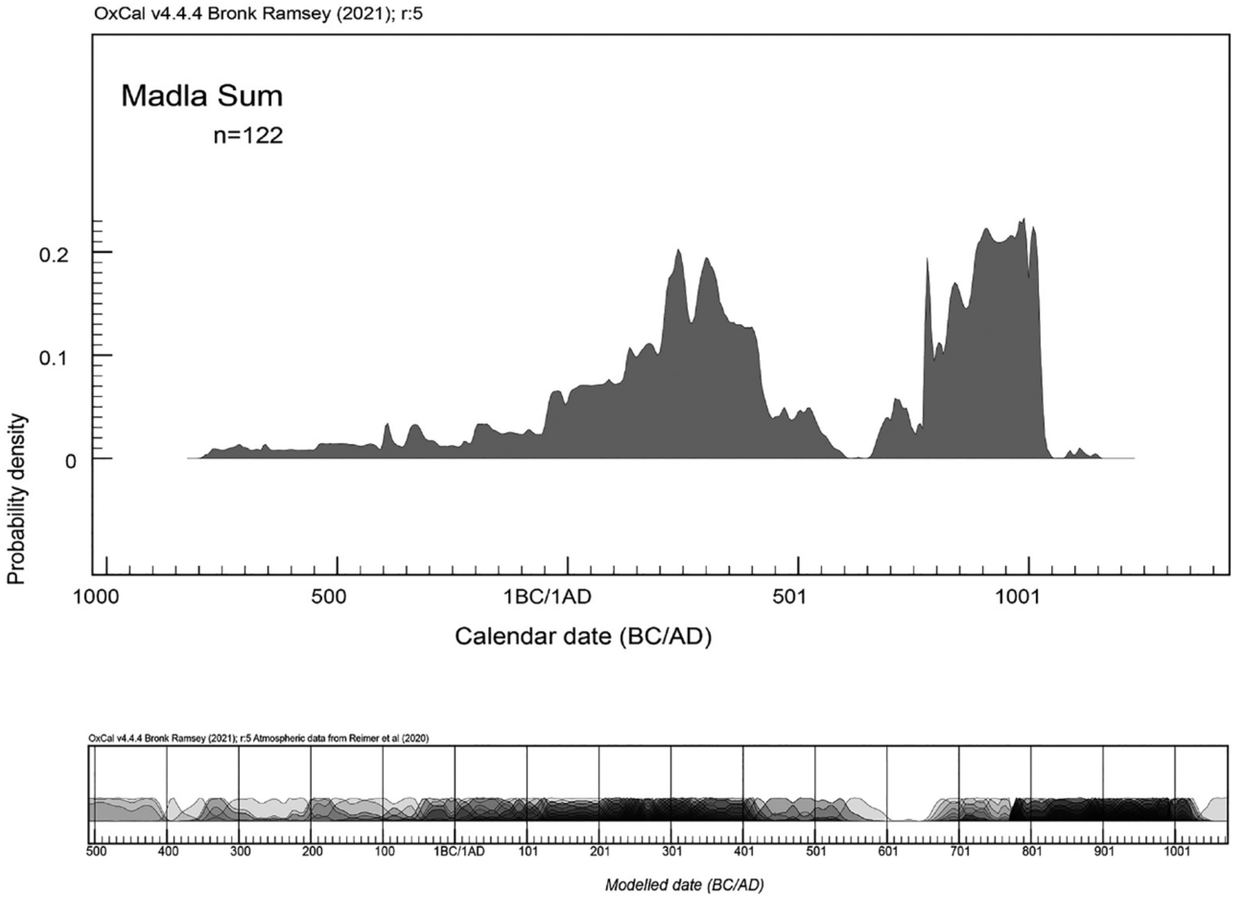


Figure 6. The distribution of the Iron Age ^{14}C-dates. Illustration: Satu Lindell.

The changes are likely to be resulting from a combination of several circumstances. They may be partly explained by a collapse in mid-6th century society after a volcanic eruption, often referred to as the 536-event, which caused a climate change, resulting in a population decrease (Iversen 2016:69–71; Løken 2020:283–289). Another explanation is a societal restructuring, starting already in the Migration Period, since the decline seems to start earlier at Madla, as can also be seen in eastern Norway (Loftsgarden and Solheim this volume). In Forsandmoen, Rogaland county, the large settlement that was in use from the Late Neolithic/Early Bronze Age became drastically smaller in the Merovingian Period and was completely abandoned at the end of the period. This is thought to have been caused by a combination of overexploitation and colder and wetter climate (Løken 2020:83–289). Similar development can be seen in Vik, Ørland county, in central Norway, where the abandonment of the settlement around the middle of the 6th century may have been caused by the local bay drying up and leading to the settlement losing its strategic location (Ystgaard *et al.* 2019:44–45). However, this settlement decline cannot be traced everywhere. In Sweden at the transition from Early to Late Iron Age, some areas even went through an expansive period as a result of intensification of production and higher population density (Pedersen and Widgren 2011:60–71). Also, in Rogaland county we can see traces of the settlements concentrating, from small settlements to more central ones, in the Merovingian Period (Myhre 2013:291–301).

Thus, the settlement reorganisation and decline do not seem to happen at the exact same time everywhere and they are most likely not even always caused by the same processes. At Madla Sør, after the reorganisation and/or possible decline of the settlement, already within a generation or so the settlement continues with even larger numbers of houses than before. This makes the site differ from the general Norwegian picture where the settlements of the Merovingian and Viking Age are generally thought to be located away from sites of the Early Iron Age. There are other examples of settlements with long continuity in Rogaland county, including Nordre Sunde, Hundvåg, Gausel, Tastarustå, Hove-Sørbø and Sømme (locations shown in figure 1) (see Armstrong and Kjeldsen 2008; Meling 2016, 2020; Bjørdal 2016; Bjørdal and Wilson 2018). The question remains as to what makes Madla Sør, and the other Rogaland sites, stand out with their long settlement continuity.

All the settlements mentioned above, apart from Hundvåg, are situated between the fjord and a larger lake, in areas with soils well suited for cultivation. Hundvåg, an island of 4,7 km^2, seems to have been settled continuously from the Late Neolithic to the Viking Age and medieval period (Meling 2016:151–161). Like Madla, Hundvåg also has four historic farms and a medieval church. In the Late Iron Age, the settlements in Hundvåg are concentrated in the central part of the island and there is some evidence that the boundaries of the historic farms were established at that time (Meling 2016:151–161). In Tastaruståa there are house remains from the Pre-Roman Iron Age, Migration Period, and Viking Age. The two Viking Age buildings were located higher up the slope, but there seems to be continuity in the settlement organisation from the Migration Period (Armstrong and Kjeldsen 2008; Bjørdal 2016:260). The farm of Gausel, mostly famous for its rich graves, had a total of 18 buildings dated throughout the Iron Age (Børsheim 2007). Here, the settlement also moved gradually up in the landscape during the Iron Age. Even though there are graves and small buildings that date to the Viking Age, there is no clear settlement phase from this time. It is speculated that the Viking Age longhouses could be outside the excavated areas, close to the Merovingian Period buildings (Børsheim 2007; Bjørdal 2016:261).

In Gausel and many other settlements seemingly abandoned in the Migration Period, there are Viking Age burials placed inside or over the buildings, suggesting that these "deserted farms" were still known and possibly in use ritually (Dahl 2016:108; see also Eriksen 2016; Dahl this volume). The re-use of older settlement sites suggests some form of "community knowledge" of the history of the area and wish for continuity and closeness to ancestors.

One common thing of the sites with longer continuity, and especially continuity from the Early to the Late Iron Age, seems to be that the excavated areas are larger, and the "missing phases" could perhaps be found outside the excavated areas, which is an important point to remember when studying the organisation of settlements in a time perspective (Gjerpe 2017:71). This may also be the case in Madla Sør. Had the excavated area been smaller, the long settlement phase we can trace could have been lost. Further, it is possible that the "missing" 7th century phase might be located outside the excavated area.

Another reason that may explain continuity of the Rogaland sites is that the topography of Norway makes the sedentary settlements small and separated from each other. Until the present day hardly more than 3% of the total land mass has been cultivated (Øye 2004:80). The area's best suited for cultivation have been preferred and are likely to have had the highest population densities. The scarcity of arable land and the divisive topography – mountains, marshes, rivers etc. – may explain the fact that many settlements in the most fertile areas go back to the 6th century, if not earlier (Skre 2001:4). These areas might also have created possibilities for a local aristocracy to develop and collect wealth (Skre 2001). The sites with long continuity in Rogaland county all have the best agricultural land with mostly strategic locations by the fjords and lakes.

An Iron Age building was most likely in use for a generation, while some could perhaps stand up to 200 years (Herschend 2009:169–171; Løken 2020:195–206; Haue this volume; Ødegaard *et al*. this volume). The old house may still have been standing, while the new house was erected close by (see also Myhre 2004:107–108; Webley 2008:34–36; Herschend 2009:140–141; Eriksen 2015:186). This dynamic development of farmyards is likely to be behind what we see in Madla Sør and some of the other sites like Gausel and Tastarustå, where new houses were being built while the old one was still in use or visible in the landscape.

The settlement at Madla Sør has area continuity throughout the settlement period, from the Bronze Age onwards towards the Viking Age, possibly excluding the period in the 7th century when, as mentioned, there is a gap in the dates. From at least the Roman Iron Age to the end of the Viking Age, the settlement also has place continuity in which we can see that the main settlement stops moving within the area and stays in one fixed point. The pattern from Madla Sør fits with the overall picture where in the early agrarian settlements the buildings are mainly in use for a shorter time, most likely for one generation. In the Roman Iron Age and Migration period the buildings are often longer lasting, and stay in the same location for several generations, demonstrated by repairs, re-building, and extensions/changes in their layout (see Eriksen 2015:188). For the Merovingian Period and Viking Age, the picture is not yet quite as clear at Madla Sør, as there seem to be both single-phase and multi-phase buildings in use. Some of this variation of types might be caused by functions that previously took place inside the longhouse or out in the courtyard being moved to a small separate building, as also seen elsewhere in Norway (Myhre 2004; Sauvage and Mokkelbost 2016:275–289; Gjerpe 2016; Ystgaard 2019).

The settlement pattern at Madla Sør thus fits the overall settlement pattern of the Iron Age, where the houses are fixed on the same plot from the Roman Iron Age onwards and towards the Viking Age (see Eriksen 2015:188–191). In the later part of the Early Iron Age and in the Late Iron Age, there seems to be a shift towards, at least for certain strata of society, physically incorporating the older house into the new by building on top of it. When the house became a permanent construction, there seems to have been a shift in the way people reflected on land and the ancestors – a shift in mentality – expressing new ways of considering land ownership and inheritance (Webley 2008; Herschend 2009:392–393; Ødegaard *et al*. this volume). In addition, a new thought is emerging about what the house may express. Eriksen (2015:191) explains this as the house becoming, in itself, a monument of inheritance, household, and ancestors. A similar process of reorganising plots into more fixed spatial structures can be found through large parts of Scandinavia, indicating that there were large-scale social, economic, and mental developments happening more or less at the same time. In addition, this attests that the settlements in Norway were following a general pan-Scandinavian tradition of building houses and organising settlements (Eriksen 2015:192). The site of Madla Sør fits well with this general picture, indicating that the people here were following the same general ways of organising settlements as the rest of Scandinavia.

Conclusion

Traditionally it is thought that there is very seldom, if ever, settlement continuity from the Early to Late Iron Age. However, there is growing evidence of continuity and complexity of different settlement organisations in Norway. In Jæren, the coastal part of Rogaland county, the continuity from the Early to the Late Iron Age is almost a norm already and more evidence pointing into the same direction is now coming to light in other parts of the country too. Madla Sør adds to this emerging picture of settlement continuity with its area continuity from the Bronze Age onwards and place continuity at least from the Pre-Roman Iron Age. In the Roman Iron Age at the latest the houses become fixed in one place, and this continues to the end of the Viking Age, when the settlement seems to be abandoned/moved.

As can be seen in the case of Madla Sør, there can be long continuity even in relatively simple settlements. In many cases where we can see longer continuity within and/or around a settlement it seems to be at least partly due to larger or more excavated areas making it possible to follow the settlement as its buildings move short distances within its boundaries. Therefore, it would be beneficial to investigate the areas as a larger entity rather than focusing only on individual sites. This would give us a better possibility to trace and understand the changes in location and continuity in area usage, especially in cases where the individual sites do not have continuity on their own.

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Maintaining boundaries: Early Iron Age settlement dynamics and spatial organisation at Dilling in Southeast Norway

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Abstract

In this article, we discuss the changes in spatial organization and development of a settlement with 136 buildings from the farm Dilling in Viken county in southeastern Norway. Most houses date between 200 BC and AD 200 but there are also buildings from the Late Bronze Age and throughout the Early Iron Age. Here, we use the building dates and their characteristics, with a special focus on farms with fences and contemporary houses constituting farmyards, to study the dynamics and spatial organization over time. We argue that there were two types of boundaries present in the landscape at Dilling: one type around larger residential areas/house areas consisting of empty space between them, and another involving smaller, individual boundaries between farms within the house areas. We also suggest that there was a change in the organisation around 200–150 BC, perhaps related to changing proprietary rights to land. This occurred at the same time as the appearance of a large farm with hall-functions.

Keywords: House classification, buildings with hallrooms, boundaries, settlement dynamics, spatial organization

Introduction

The internal organisation of buildings and the relation between buildings and other settlement traces such as graves, cooking-pits, property boundaries, and roads are central to the study of settlements as a dynamic social space over a period of time. However, since most archaeological excavations in Norway are heritage management archaeology conducted on relatively small surface areas, it is often difficult to get a dynamic overview of a site in a long-time perspective. This study will discuss two localities, one larger site with a continuous surface area of 7 hectares with six building clusters (id[1] 74), defined as "house areas" 1–6, and an additional smaller site with house area 7 (id 73) to the northwest (fig. 1), excavated by the Museum of Cultural History, University of Oslo in 2017 and 2018. This large-scale excavation was carried out at the farm Dilling, in Moss municipality in Viken county (former Østfold county) (fig. 1). The site has the potential to significantly increase our understanding of Early Iron Age settlements. The material invites a study of the spatial and social organisation of landscape and farms and not least, quite rare in Norwegian prehistory, of the spatial and social relationship between farms from the

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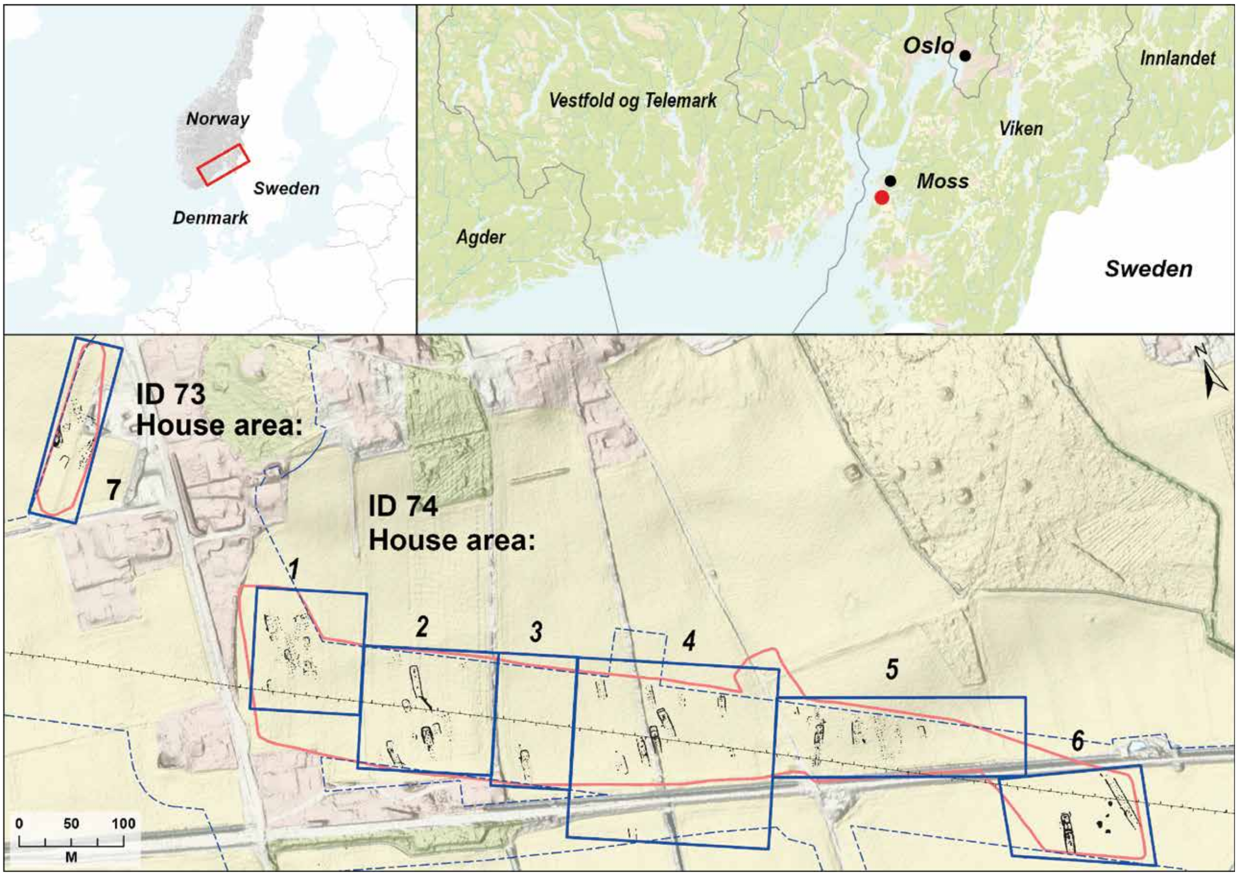


Figure 1. Above: The Dilling settlement areas location in Norway is marked in red. Below: The Dilling settlement with the house areas marked: 1-6 (id 74) and 7 (id 73). Illustration: Linnea Syversætre Johannessen.

same period. A study of construction and reconstruction of buildings on demarcated or at least partly enclosed plots encourages a discussion on the rights to land and borders, as well as on fences as practical means of marking boundaries.

Approximately 136 buildings or parts of buildings from the Early Iron Age, mainly dated between 200 BC and AD 200, were identified at Dilling (Ødegaard and Winther *in prep*.). Each of the six house areas in the larger locality (id 74) are separated by zones without traces of settlement, interpreted as boundaries marking farm units and/or resource areas, perhaps reflecting some form of proprietary rights. We interpret these six house areas and the smaller locality to the north (id 73) as regulated plots of land (fig. 1). The smaller site (id 73), a couple of hundred meters to the northeast and a bit higher in the terrain, was settled both before and after the larger site (id 74).

In addition, we identified eleven fences. Some if not all house areas consisted of several simultaneous buildings and a farmyard delimited by fences. The dates and internal land organisation suggest we are dealing with several contemporaneous farms, and we can see sequences of buildings that have been standing on the same plot. When we compare this settlement to other excavated settlements in the region, we can see that we are facing a settlement type previously unknown in eastern Norway (Gjerpe 2017) — in fact, it is usually assumed that there were no prehistoric hamlets or villages in Norway, at least in this part of the country. It also differs from the organised settlements known from southern Scandinavia in this period and from the hamlet or village at Forsandmoen in western Norway (Løken 2020).

The aim of this paper is to discuss how the settlement at Dilling developed and was organised spatially over time. Fences are a type of construction that allows you to organise your housing unit and to divide the farm into different zones to control animals' and people's movements (Eklund 2007:347) as well as to manifest the owners' powers in a symbolic way (cf. Rindell 1999:91). Through the fences and their boundaries in the landscape, it is possible to discuss chronological and spatial connections between farms and farmyards, as well as property rights in the Iron Age. Here, we will investigate the buildings and their spatial development at the site over time and view

Size and function	Type	Characteristics
Larger main buildings with dwelling and byre	1	Long buildings with extracted posts in one trestle
	2	Long buildings with modules
	3	Buildings with dwelling and barn
	4	Long buildings with solid postholes, convex form and extracted posts in the gable
Medium main buildings with dwelling and byre	5	Medium-sized buildings with centred entrances
	6	Medium-sized buildings with straight central naves and rounded gables
Economy buildings: workshops, storages, granaries	7	Short buildings with specialized functions
	8	Six post constructions
	9	Four post constructions
	10	Two-aisled buildings
	11	Irregular, short buildings
	12	Pit houses
Special buildings	1	Very long houses (grouped with long buildings, type 1)
The rest	No type	Ungrouped houses

Table 1. House types, form and function.

the site in relation to other contemporary sites in Norway and southern Scandinavia in the same period. We will use statistical modelling of C14-dates from buildings to discuss the settlement and internal organisation of farms, in order to assess the spatial organisation at Dilling in a temporal perspective. First, we will present the excavation results and the different house types at Dilling.

House types at Dilling

In total, 136 buildings were identified, of which 98 were three-aisled, 7 two-aisled and one possibly single-aisled. Most of the three-aisled buildings were domestic buildings with barns and living quarters, and the largest ones also included sections with economic or storage facilities. Of these buildings, 7 were six-post structures and 18 were four-post structures, as well as 5 possible pit houses, which served as workshops or storage buildings/granaries (Ødegaard and Winther *in prep*.). It is also likely that the two-aisled buildings were economic buildings of some sort, while a few of the smaller three-aisled buildings may only have contained economic and/or storage facilities and no living quarters. The smaller structures clearly indicate that economic buildings with specific functions, as opposed to all-purpose buildings, were represented (Ødegaard and Wither *in prep*.; see also Herschend 2009:171; Martens 2010:242; Fransson 2019; Løken 2020). The orientation of the buildings largely follows the terrain, which is gently sloping from north to south. The smaller site is close to the top of the large end moraine Raet, while the larger site is situated in the transition from the moraine to silt and clay marine plains.

The three- and two-aisled buildings were between 4.6 and 65 meters long, with an average length of 17.5 meters. Their widths were between 2.3 and 7.8 meters, with an average of 6.3 meters. The building traces are dense and overlapping, and thus the level of preservation and identification varies. In 79 of the 98 three-aisled buildings it was possible to trace certain or possible remnants of the wall construction, giving a fairly good idea about the buildings' widths.

In all, 121 buildings were identified in house areas 1–6 (id 74), while15 buildings were identified in house area 7 (id 73). The majority of the buildings are dated to the Late Pre-Roman Iron Age and Early Roman Period (200 BC–AD 200), but there are also older and younger buildings. Three buildings are dated to the Early Bronze Age (1700–1100 BC) and four to the Late Bronze Age (1100–500 BC), while thirteen buildings are dated to the Late Roman period (AD 200–400) and the Migration period (AD 400–550). In addition, 20 buildings are undated.

The buildings are divided into twelve house types, based on common characteristic and observable features (listed in tab. 1): position of the postholes, house size (length/width), number and location of entrances, presence and location of ovens/fireplaces, and the shape and construction of the gable wall and the walls in general (Ødegaard and Winther *in prep*.).

Methods for dating buildings

There is currently no house chronology for eastern Norway (but see Løken 2020 for a typology for Rogaland, southwestern Norway, probably with relevance for eastern Norway as well). Further, there are very few objects from buildings that allow for precise dating. Consequently, ^{14}C dating of charcoal or charred macrofossils from postholes, fireplaces or other dug-down parts of the buildings are essential for dating the buildings. The large amount of building material of a later date at Dilling has made it

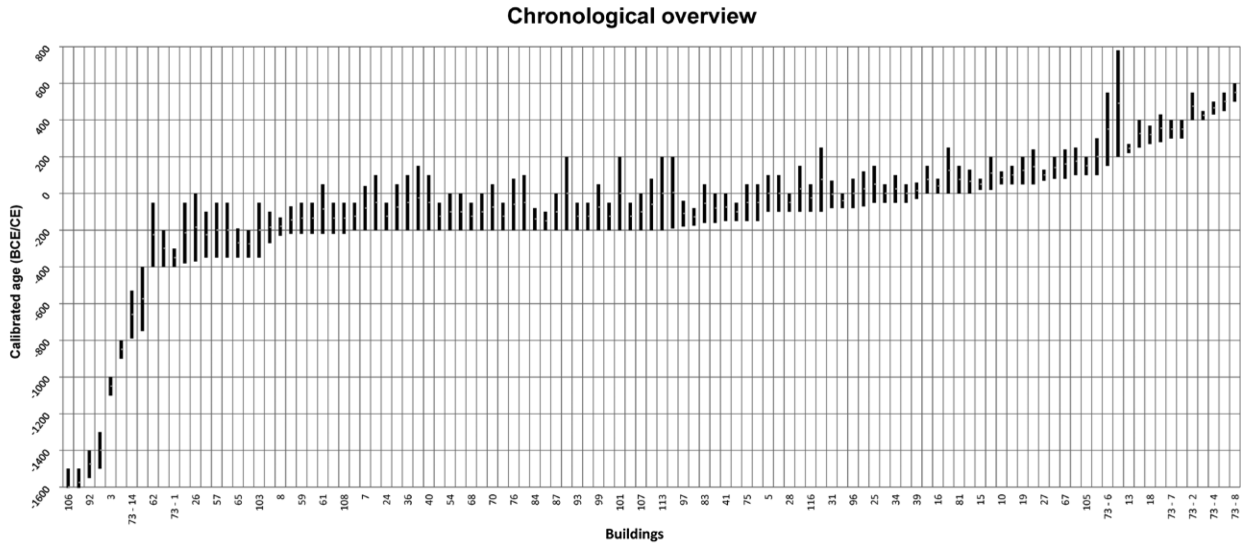


Figure 2. Dates from 111 of the 136 buildings. As can be seen, the main settlement activity dates between 200 BC and AD 200. Illustration: Linnea Syversætre Johannessen.

possible to make quantitative assessments of the material in a time perspective. In all, 383 samples from 111 buildings were dated, of which 199 samples are of grains, 168 of charcoal and 15 of ceramic shards (Gjerpe *in prep*.). Due to preservation conditions and a lack of charred grains in postholes, charcoal from 100 postholes was dated.

The number of dates from each building varies from one to thirteen. If available, horizontal stratigraphic information was also exploited to determine the buildings' age/use period as well as statistical programs. The program BCal was used to establish a relative chronology and in some cases also to estimate the age of buildings (Buck 1999). OxCal was used to calibrate ^{14}C-dates and to sum the results of several dates, with or without stratigraphic information (Ramsey 1994, 2001). The sheer number of dates from Dilling also gives a quantitative assessment of the material and context of the site (Gjerpe *in prep*.).

Figure 2 shows the dates of 111 of our 136 buildings. As illustrated, the main settlement activity was between 200 BC and AD 200, with, however, the large majority of the buildings dated to a period of roughly 200 years. Nevertheless, using horizontal-stratigraphic information and statistical analysis, we can achieve a more precise span of dates. If there is more than one ^{14}C-date from a building, the dates are calculated with the Sum function in OxCal, and any stratigraphic information is utilized by the Phases function (Ramsey 2017). This allows us to estimate, with a higher degree of statistical viability, a probable use period of particular buildings. Some buildings have most likely been standing for less than 100 years, one perhaps for as short a time as 30 years. Around three-quarters of the buildings have a date span of less than 200 years, and all but one less than 400 (Gjerpe *in prep*.). Normal three-aisled buildings in the Iron Age were most likely in use for less than 200 years, by some scholars assumed to be standing for one generation (Herschend 2016; Løken 2020:195–206). If buildings had such short lifespans, the dating span is generally longer than the lifespan of the buildings (Gjerpe *in prep*.). The result is that the different buildings appear simultaneous in date and are located on the same plot of land; however, they cannot have been standing at the same time.

In many cases, it is difficult or impossible to determine exactly which, or how many, of the buildings were standing simultaneously, thereby making it difficult to calculate the number of households. Nevertheless, the material indicates that there was probably only one large dwelling in each house area at the same time, indicating successive farms, possibly with intermittent periods without settlement (Gjerpe *in prep*.). The relative and modeled C14 dates of the buildings provide a starting point for understanding the origin, organization, change and end of the settlement.

To study the settlement's phases and changes over time, we have, in the figures, used the buildings' midpoint dates (BP dates), divided into 200-year periods for illustration purposes. The exception is for the oldest settlement activity, which was scattered, and therefore illustrated within the period 1600–400 BC.

The spatial and temporal organisation of the settlement at Dilling

These house classifications and dates presented above will now be used as a basis for a discussion of the settlement organisation through time at Dilling. Evidence of Bronze Age and Early Pre-Roman Iron Age activity was fairly modest. Bronze Age consisting only of four

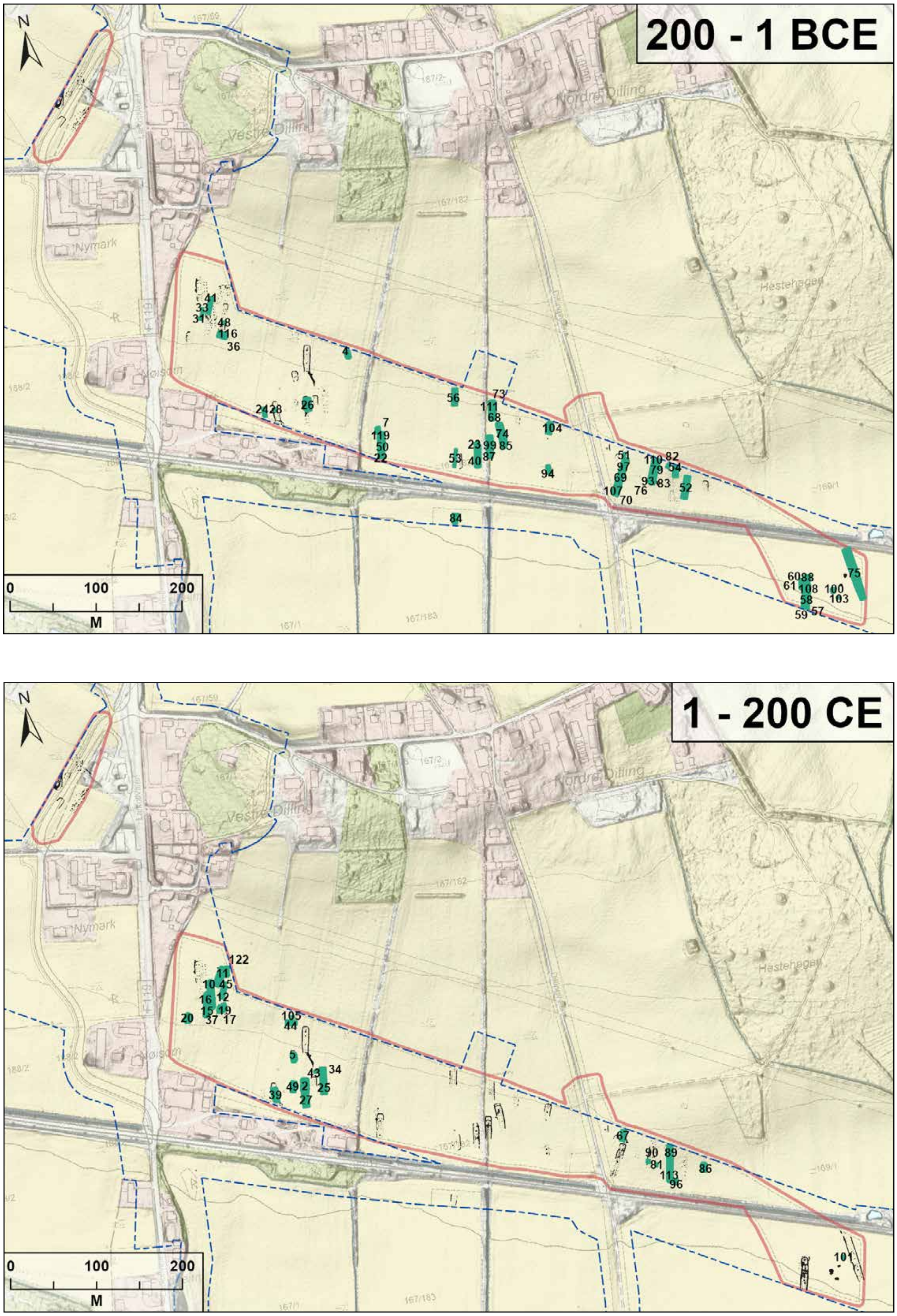


Figure 3 A) top and B) bottom. The buildings in use at Dilling in two-hundred-year intervals, 200–1 BC and AD 1–200 respectively. Houses in use are marked in green, with the house numbers referred to in the text. Illustration: Linnea Syversætre Johannessen.

buildings from around 1550–1400 BC and three from the period 1100–600 BC, located in house area 1, 4, 5 and id 73. In the early part of the Pre-Roman Iron Age, seven buildings were standing at Dilling: domestic buildings in areas 2 and 4, and small workshops / granary buildings in area 5 and id 73. There were no longer any buildings in house area 1. While still mainly quite small, the three-aisled buildings of this period were larger than the Bronze Age buildings, and they accommodated a household and a barn for stabling livestock. The buildings may have constituted just one farm or even three contemporaneous farms, some including workshop buildings.

Around 200 BC, the settlement changed character. While activity in id 73 ceased, activity in house areas 1–6 was at its most extensive in the period 200–1 BC (fig. 3 a). This is the main settlement period at Dilling, with altogether 54 dated buildings. However, the C14-dates indicate that only between five and seven buildings were standing simultaneously. Activity was especially intense in house area 4, with several large buildings dated to this period, followed by areas 5 and 6 (fig. 3 a).

The dominant building type between 200 and 1 BC was three-aisled buildings with several functions (types 1–3), housing both humans and livestock, as well as workshops and storage. In the last part of this phase, buildings with solid post holes were introduced, but they were most numerous later (c. AD 300–500). There were also some medium-sized buildings and smaller economy buildings (types 5–7) in use, mainly dated to between 200/150 BC and AD 150/200. The average size for the buildings in this period was 180 m^2, while the largest measured up to 220 m^2. Interestingly, this phase contained only a few small workshops (types 8–11), indicating that the large houses accommodated these functions within the longhouse and did not need specific buildings for economic activities (Ødegaard and Winther *in prep*.). In this extensive settlement period, people started to bury their dead in house area 1 (Ødegaard *in prep*. a).

In the Late Pre-Roman Iron Age, an especially large house was erected at Dilling (house 75). This building was over 65 meters long, but as its northern end lies beneath the existing railroad we could not establish its exact length. Still, this is the largest known building from this period in Scandinavia (Ødegaard and Winther *in prep*.). The building has a parallel in another large building from Viken, found at the farm of Missingen, only 15 kilometers south of Dilling. The Missingen building (house 1) was 61 meters long and has been interpreted as a hall for a warrior elite (Bårdseth 2009). The house may resemble the Forsand building type 7.4, a building with hall functions (Løken 2020:142–145), characterized by an extended central trestle, making a larger space without posts – a hall-room. Missingen and Veien, the other type 7.4 buildings from Norway, are dated to the (Early) Roman Period. However, some Swedish Pre-Roman Iron Age houses may express the same ideas (Løken 2020:146 with references to Karlenby 2007).

House 75 may also contain an extended trestle; however, only one posthole of the trestle (nr. 7) is preserved (Ødegaard and Winther *in prep*.). With finds indicative of trade and craftsmanship at Missingen, it has been suggested that it was a central place (Maixner 2015), which differentiates the site from Dilling, where we could find no such indicators. Nevertheless, finds of two terminals from one or possibly two torques[2], a contemporary ruler symbol (Pedersen 2003:242–432), indicates contact with the Continent and involvement in extensive networks in the Pre-Roman Iron Age. As only six torques are known in Norway (Resi 2011), this is quite exceptional. The sheer size, regardless of the possible hall-room at house 75, indicates that this house must have had a larger socio-economic status than others in the settlement and, indeed, in the region at large.

After the peak in activity in the last two centuries BC, the settlement at Dilling changed again between AD 1–200 (fig. 3 b). The settlement in the southeastern and middle parts (house areas 6, 3 and 4) was abandoned, while activity in the areas to the west intensified (house areas 1 and 2). Correspondingly, there was also a shift in the building type. Longhouses (types 1–3) went out of use before AD 100 and were replaced by medium-sized buildings (types 5 and 6) of which some may only have constituted specialised workshops or barns. Type 4 buildings were introduced, with one house in house area 1. In addition, there were a few small four-post buildings or granaries (type 9) for hay, grains, animal fodder etc. The smaller house types, whether three-aisled, two-aisled or irregular (types 7, 10 and 11) went out of use around AD 100–200 (Ødegaard and Winther *in prep*.).

In the Late Roman Iron Age, AD 200–400, the settlement changed yet again (fig. 4 a). The settlement was declining and there were only a few buildings standing in the north-west, in house area 1 and id 73. This is the main use phase for the long convex buildings (type 4). It is thus clear that the settlement was moving up onto higher ground, which can also be seen in simultaneous settlements elsewhere in Norway (Bårdseth and Sandvik 2007; Gjerpe and Østmo 2008; Grønnesby 2013:84). During this period, activity in house area 1 also ceased, while settlement continued in id 73 well into the 5th and possibly the 6th century (fig. 4 b). Longhouses with dwelling and barn (type 3) dominate, followed by the longhouses with extracted posts in the gable (type 4), and in addition there were houses of medium size (types 5 and 6), and a few workshops and granaries (types 7 and 9).

The material from Dilling illustrates continuity as well as how the settlement fluctuated and changed location over time. The houses became increasingly larger, a

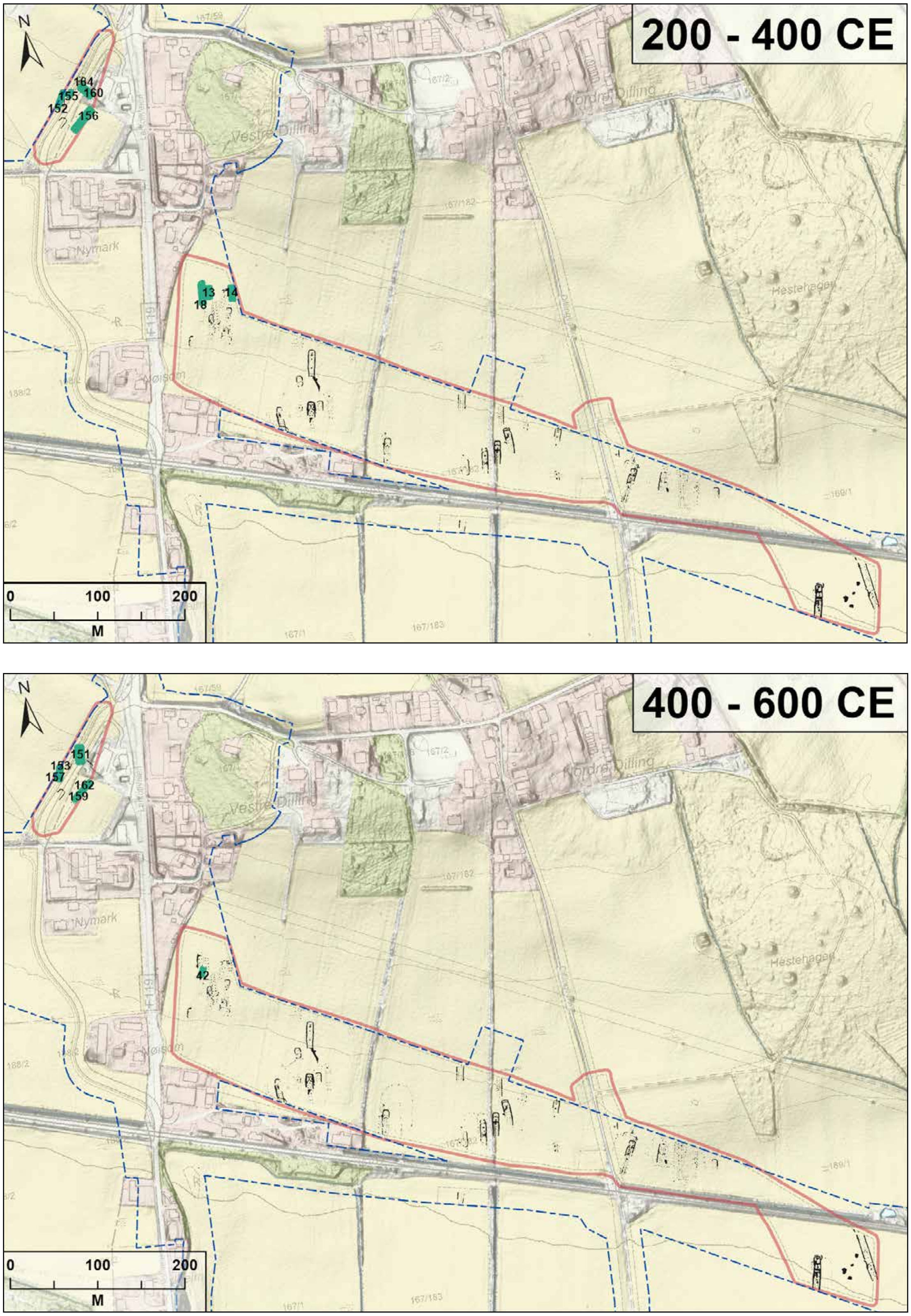
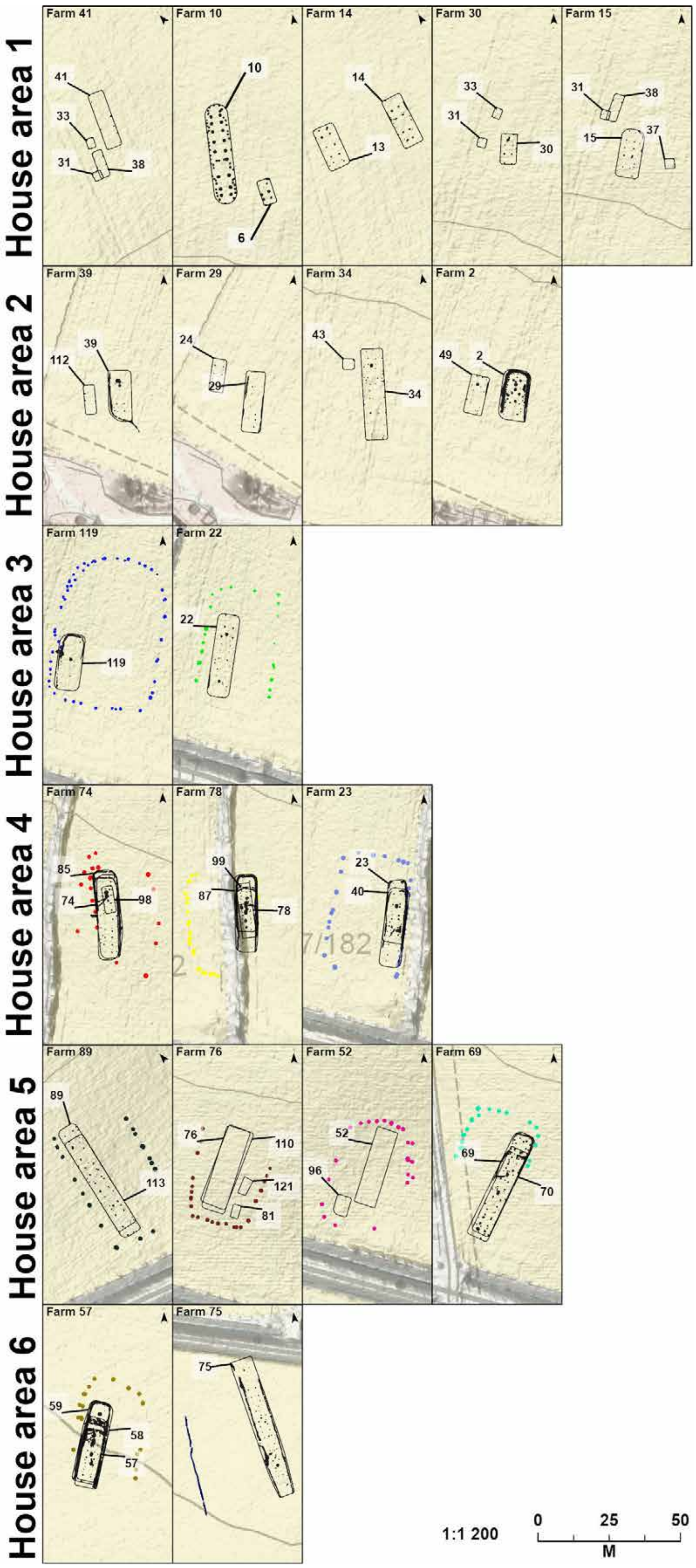


Figure 4 A) top and B) bottom. The buildings in use at Dilling in two-hundred-year intervals, AD 200–400 and AD 400–600 respectively. Houses in use are marked in green, with the house numbers referred to in the text. Illustration: Linnea Syversætre Johannessen.



development reaching its peak between c. 200 and 1 BC, while in the subsequent period large longhouses (types 1–3) went out of use, being replaced by medium-sized buildings (types 5–6) and more workshops and granaries (types 7–11). The long building type with extended gables (type 4) is the youngest type of large longhouses, and all examples of it are, with one exception, dated between AD 200 and 400. Around AD 300, the buildings' maximum sizes increased again, and at the end of the Roman Iron Age the situation was relatively comparable to the earlier period BC 200–1. In the last phases of the settlement's lifespan, the settlement moved to higher ground towards the top of Raet. The settlement might have continued outside of the excavated area; however, abandonment of settlements in the 6th century was not uncommon in Norway, reflecting, amongst other factors, climate change and the Justinian Plague (e.g., Myhre 1974; Rødsrud 2017; Gundersen 2018; Solheim and Iversen 2019; Løken 2020; Ystgaard 2021:390; Loftsgarden and Solheim this volume).

We have now looked at how the settlement changed over time. Interestingly, the buildings are all located within the house areas, suggesting that these zones were well-known and accepted. Can the organisation of the buildings – when they are compared to one another – give more information about the internal structuring and contemporaneity within the house areas?

Internal spatial organisation of farms

The life expectancy for a three-aisled building was, as mentioned above, probably a generation (Herschend 2016). Therefore, rather few of the buildings at Dilling were standing at the same time. In all, 20 possible farms enclosed by a fence and / or simultaneous smaller buildings have been located, all located on the larger site of id 74 (tab. 2; fig. 5). Ten post-built fences (fences 188–199) and one consisting of a ditch with possible posts on both sides (house 75) were identified (tab. 2; fig. 5), each enclosing one or more buildings, thus constituting a farmyard (Ødegaard *in prep*. b).

Figure 5. Farms with associated houses and / or fences within the respective house areas. Illustration: Linnea Syversætre Johannessen.

Main building	House type	Date, main building	Midpoint date, main building	Simultaneous building(s) on the farm	Date, simultaneous building(s)	House type	House area	Distance between buildings	Fence (id)	Fenced area (m²) / enclosure	Date period
119	1	160–1 BC	80 BC	--			3	--	191	1788	PRIA
22	1	175–80 BC	128 BC	--			3	--	192	>1004	PRIA
74, 85, 98*	1, 3, 6	200–50 BC, 200–100 BC Not dated	125 BC 150 BC Not dated				4		193	–	
78, 87, 99*	5, 3, 3	200–40 BC 200–100 BC 200 BC– AD 50	120 BC 150 BC 75 BC				4		194	ca. 850	PRIA–ERIA
23 40*	3	200 BC–AD 100 200 BC–AD 100	50 BC 50 BC				4		197	1030	PRIA–ERIA
69 / 70*	1, 2	200– 50 BC 200–1 BC	125 BC 100 BC				5		198	–	PRIA–ERIA
89 / 113*	1	200 BC– AD 200	AD 1				5		190	>1150	PRIA–ERIA
76 / 110	1, 3	200 BC–AD 80	60 BC	81 121	Not dated	9 8	5	6,5 2,5	199	>830	PRIA–ERIA
52	3	150–50 BC	100 BC	96	80 BC– AD 80 CE (AD 1)	11	5	4	195	ca. 900	ERIA
57 / 58 / 59*	3	350–50 BC 350–50 BC 220–50 BC (house 59)	200 BC 200 BC 135 BC	60	BCE220–50 BC (135 BC)	7	6	7/2,5	196	>850	PRIA
75	1	150 BC– AD 50	50 BC				6		711720	––	
41	3	150–1 BC	75 BC	31 33 38	80 BC–AD 70 (5 BC) 200 BC–AD 50 (75 BC) 200 BC–AD 150 (75 BC)	8 9 6	1	8 <4 <3	--	--	PRIA
10	4	AD 50–120	AD 85	6	200–1 BC (100 BC)	6	1	8	--	--	ERIA
14	4	AD250–400	CAD325	13	AD 220 – 270 (AD 225)	6	1	19	--	--	LRIA
30	5	50 BC–AD 50	AD 1	31 33	80 BC–AD 70 (5 BC)	8 9	1	5 5	--	--	PRIA–ERIA
15	6	AD 20–80	AD 50	31 37 38	80 BC–AD 70 (5 BC) 50 BC – AD 50 (AD 1)	8 9 6	1	6,5 8 5	--	--	ERIA
39	3	30 BC– AD 60	AD 15	112	200 BC– AD 150(AD 25)	6	2	5	--	--	PRIA–ERIA
29	3	350–100 BC	225 BC	24	200–50 BC (125 BC)	6	2	8	--	--	PRIA
34	2	50 BC–AD 100	AD25	43	100 BC –AD 150(AD 25)	9	2	3	--	--	PRIA–ERIA
2	5	125 – 80 BC	128 BC	49	70 BC –AD 120(AD 25)	un- grouped	2	5	--	--	ERIA

Table 2. Main buildings and buildings that we can say with certainty or with a large degree of certainty belonged to the same farm unit (here called simultaneous buildings) based on their location, dating and orientation. When there are no fences, the distance between possible buildings on the same farm is listed, while the enclosed / fenced-in area and the main usage phase of the buildings are listed at the end. * Phases of the same building. Mark that house 31 and 38 cannot have been standing at the same time as they overlap, and it is likely that house 38 is younger (see also fig. 5 and 6).

However, the posts are not dated by the C14-method, and most of the fences were identified in the post excavation follow-up work and are thus a bit uncertain. The number of posts in the fences varies between 8 and 62 and the fences probably consisted of latticework or were rail fences of the type called “skigard“ in modern Norwegian. Fence 191 is the largest, enclosing an area of 1700 m² (tab. 2) and has what may look like double posts, and may have been another type of construction, perhaps a fascine fence[3] (see Ethelberg 2003:231, Fig. 104). Most of the enclosures were rectangular in shape and lie with the longitudinal direction oriented approximately north–south. With two exceptions, the enclosures were between 24 and 27 meters wide, and they appear to have been 40–50 meters long (tab. 2; fig. 6), thus constituting an area of between 830 and 1788 m^2, with their average area approximately 1000 m^2. All fences enclosed large and medium-sized three-aisled buildings with dwellings and a barn, most of which also contained workshops and/or storage rooms. Interestingly, long buildings with solid postholes and extracted posts in the gable (type 4) do not have any simultaneous buildings and/or an enclosed farmyard with fences (tab. 2).

In three enclosures (195, 196 and 199), two or more buildings have been identified, which, based on their dates, location, and orientation, presumably constituted one farm unit. Two long three-aisled buildings were connected to smaller workshops (fence 195 with house 52 and small house 96; fence 196 with buildings 57/58/59 and small house 60), and one long three-aisled building stood adjacent to two smaller economy buildings (fence 199 with house 76 or 110 and the smaller buildings 81 and 121[4]). These buildings are more or less parallel to each other and had a short distance between them, between 2.5 and 6.5 meters (tab. 2; fig. 6).

As illustrated in table 2 and figure 5, nine possible farms were identified as consisting of one main building and one or more contemporary houses with no traces of fences, all dated to approximately 200 BC–AD 200. However, there might be a problem finding which buildings are simultaneous since some of these buildings do not have adequate resolution from the C14-dates. Therefore, to identify which of these buildings constituted a farm, mutual distance, orientation and building types will be utilized (tab. 2).

In house area 1, buildings 41 and 30 partly overlap in time, but these farms cannot have been standing at the same time as they partly shared the same plot. It is likely that house 41 is the older (tab. 2; fig. 6). The same can be said with respect to houses 15 and 30, in which house 15 may be the younger, from the Early Roman Iron Age (fig. 6). The dating of house 10 partly overlaps with that of several other buildings, but since they either overlap spatially (i.e. share at least part of the same plot) or are extremely close to each other, it must be considered impossible that they are contemporary. In the Late Pre-Roman Iron Age, there was most likely only one main farm in house area 1. In the Early Roman Iron Age, there are several other buildings in house area 1 (fig. 6). Several houses overlap, and if, indeed, houses 13 and 14 formed a farm, it is only one other house (house 12), dated to the first 150 years of our era, that may have been contemporary with some of the other farms. In the Late Roman Iron Age they may not have stood at the same time as house 18. All in all, it is possible, but not very likely, that there was more than one farm in house area 1 at any given time.

In house area 2, buildings 29 and 39 overlap, so they cannot be contemporary. It is likely that house 39 is the younger (table 2; figure 6). A relatively large farm consisting of house 8 was built between houses 29 and 2, dated to 230–130 BC. House 29 was most likely built after this, and it may have been standing at the same time as house 39. Thus, there may have been two farm units in house area 2 in the transitional period between the Late Pre-Roman- and Early Roman Iron Age.

House area 3 does not contain more than two buildings, and they overlap, thus they cannot have been standing at the same time. It is most likely that building 22 is the oldest farm here (table 2; fig. 6).

In house area 4, we identified many large buildings dated to approximately the same period in the Pre- and Early Roman Iron Age and interpreted as farm units (tab. 2; fig. 5 and 6). Theoretically, the farms with buildings 74 and 23 may have stood at the same time, and these buildings have subsequent building phases in the same plot. It is probable that house 74 is the oldest, while houses 87 and 85 have identical dates and may have been standing at the same time. Houses 23 and 40 are possibly somewhat younger. The material from house area 4 nevertheless indicates that there may have been 1–3 simultaneous farms between 200 BC and AD 100. However, if we assume that the buildings only stood for one generation, it is likely that one was built more or less as soon as the other fell into disuse or was pulled down.

In house area 5, houses 89 and 113, which follow each other spatially and geographically on the same plot of land, have a long date span and it is not possible to say which of the two buildings is the older (tab. 2; fig. 6). These farms cannot have been standing at the same time as the farm containing house 52, since the fence of the latter is located inside house 89. Theoretically, there may have been three farms at the same time in house area 5 in the Pre- and Early Roman Iron Age, and these are the ones that include buildings 69/70, 76/110 and 52 with outfield building (house 96). However, since the farms belong within a 400-year chronological framework, they probably represent a series of farms.

House area 6 contains two fences, one of them surrounding houses 57/58/59, which denotes subsequent phases of the same building, possibly embracing building 60, which has a contemporaneous dating. However, the fence (196) cannot have been standing at the same time as house 60 (fig. 6). House 60 overlaps with house 59, so they are not contemporary. In the succeeding phase, the large house 75 in house area 6 was probably surrounded by a fence (711720), 45 meters of which we identified (tab 2; fig. 6).

The material from Dilling indicates that several farms may have been standing at the same time; however, they may just as well have succeeded each other internally on

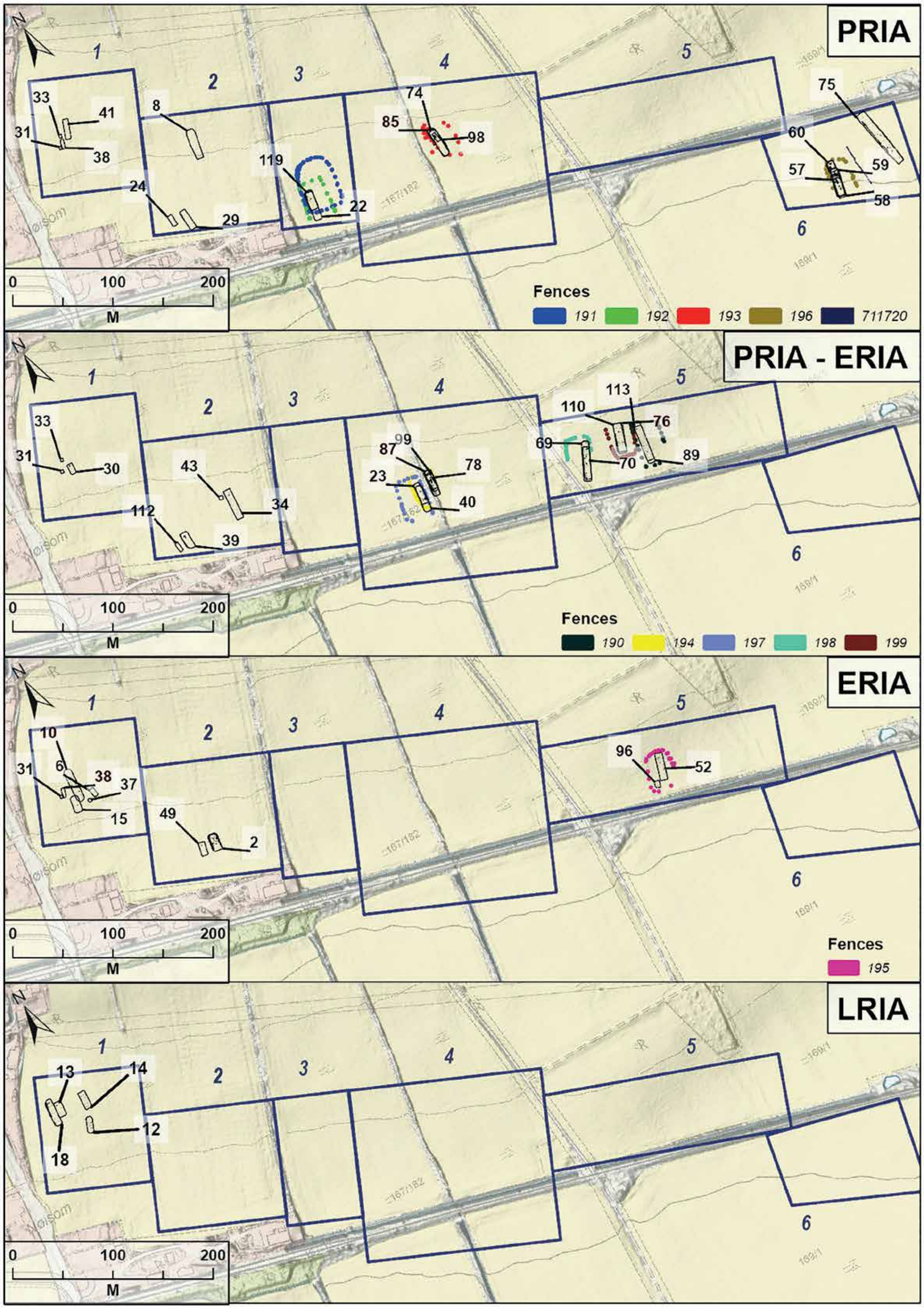


Figure 6. Chronological overview of the farms' spatial organisation on Dilling from Pre-Roman Iron Age to the Late Roman Iron Age. Blue marks the house areas. Illustration: Linnea Syversætre Johannessen.

the settlements. Several of the farms had an in-fenced yard of around 1000 m^2 within the house areas. Visible demarcations around the house areas cannot be identified. On the contrary, these areas were empty of structures, indicating that the house areas were respected and fixed for centuries. The house areas reflect forms of an overall division of the landscape, and the fences constitute internal subdivisions of this large-scale system of organisation. The questions thus remain: what did the house areas represent in contrast to the smaller in-fenced farms; and was there a different type of ownership of land, or of rights to land expressed in the landscape at the same time?

Discussion: Spatial organisation and social-economic relations at Dilling

Looking at the wider picture, division of the landscape in southern Scandinavia may have started as early as the end of the Bronze Age (Løvschal and Holst 2014). Agriculture demands ordering of the landscape and demarcations – material or mental. There are clearly different types of boundaries, some based mainly on norms, rights and identity, others on physical markers – and a boundary often includes all of these features. Boundaries are spatial technology with a social and cognitive content people must learn – or be taught (Løvschal and Holst 2014). The mixed farming practiced at Dilling required that animals had to be separated from the fields, so that they did not eat the crops and vegetables. Fences around farms are rarely identified in the Early Iron Age, and few examples are known from eastern Norway or Scandinavia in general (Løvschal and Holst 2014; Myhre 2002). On the other hand, notable examples of Iron Age stone fences are known from, for example, Rogaland in southwestern Norway, eastern Sweden and the islands in the Baltic Sea (Petersen 1936; Pedersen and Widgren 1998:274; Svedjemo 2014). Solid stone fences were not common in the Early Iron Age in eastern Norway. Turning to Dilling itself, while it can be problematic to identify property boundaries in the early parts of the Iron Age (see Östling 2007:320–321), there were two types of boundary present in the landscape that testify to forms of property markings and land division (building on Løvschal and Holst 2014): one, consisting of empty space between the different house areas, constant over time, and another between the individual farms within a house area, often marked by fences that changed over time.

The house areas were identified by absence of structures between building clusters, a feature that has also been identified elsewhere, such as at Ørlandet in mid-Norway (Heen-Pettersen and Lorentzen 2019) and Uppland in Sweden (Östling 2007:320–321). Individual farm fences were in use throughout the Pre-Roman Iron Age and persisted into the Early Roman Period at Dilling. However, no fences from later than c. AD 200 are known (see also fig. 6), but whether this represents factual conditions or the fact that we are not able to identify later fences is uncertain. If the change is real, it may reflect social and possibly economic changes taking place in this period. Interestingly, this is also the period when the longhouse type with extracted posts in one trestle dominates (type 4). At this time, the settlement also moved northwest and higher up in the landscape, perhaps due to a general reorganising of the settlements and/or a wetter climate.

In large parts of Scandinavia, fixed fields can be seen throughout the Early Iron Age, where farms changed location and "wandered", while smaller cultivated patches were re-organised, and others lay fallow (Pedersen and Widgren 1998:278; Gjerpe 2017:192). In the oldest phases of the settlement, the buildings at Dilling were built on undeveloped plots within the house areas. After the initial house was built, the house areas already seem to have been established, because later houses respect the house area boundaries. A change took place around 200 BC, when buildings were built, repaired and rebuilt on the same plot, only being moved perhaps a few meters north. This pattern occurs in the rest of Viken county at the same time; however, it is more or less unknown in the rest of eastern Norway before c. AD 200 (Bukkemoen 2015; Gjerpe 2017:188, 191, 216, 218; see also Lindell this volume). A similar pattern is seen in the earliest part of the Pre-Roman Iron Age in Jutland and in the subsequent period in the rest of western Denmark and southwestern Sweden, when the location of buildings and the spatial pattern of settlements became much more fixed, as did the boundaries of larger cultivated fields (Pedersen and Widgren 1998:280–281, 432; Webley 2008:149). The fertilization we have found traces of at Dilling from the Pre-Roman Iron Age onwards supports the idea that the fields were relatively fixed and in use over longer periods (Ødegaard *in prep*. b).

It can be assumed that the floor space of a building indicates the number of members of a household inhabiting a house and varying degrees of access to arable and grazing land (Herschend 2009:174–175; Løken 2021:227). Furthermore, it can be assumed that the surface area of enclosed farmyards can reflect the owners' rights to land (Holst 2010). Many of the farmyards at Dilling were around 1000 m^2 in ground area in the period between 200 BC and AD 200, which may indicate a standardization in the settlement area for individual households. The buildings were also relatively standardised in size (three-quarters of them were between 18–30 meters long), indicating that the rights to land and the status among the households may have been relatively equal. At the same time, some farms were smaller than others, suggesting that they could have been subordinate to the larger farms. There were also a few exceptionally large buildings, notably house 75 in house area 6 with a length over 65 meters, and also the large, enclosed farm in house area 3 with a farmyard nearly twice as large as the others. This indicates that some had greater social and economic capital than others. Differences in house size, suggesting increasing social and economic differences, can be seen all over Scandinavia from 200 BC (Pedersen and Widgren 1998:421).

The new stability in the pattern of settlement and its impact on the landscape occurring from the centuries before the Common Era at Dilling may result from changes in the settlement system, agriculture, and land tenure. Even though the dwellings were now more fixed, the actual lifespan of each house was short-lived, as some buildings from Dilling also clearly were, standing perhaps for as little as 30 years in one case (Gjerpe *in prep*.). When the housing cycle of one domestic group ended, a subsequent household was replaced by a new social unit that built a new house on the same plot of land. The building of a new house could have been a collective event, and when the new house was finished it would signal a new head of family, ending a domestic cycle with a redistribution of land within the family group or the local community (Webley 2008:149, Herschend 2009:169; see also Holst 2010:171). This redistribution of land was most likely carried out by leaders in the local community (Pedersen and Widgren 1998:279–80), such as those living in the large house 75.

It has been argued, with a reference to Tacitus's description from AD 98 of the Germanic people, that the land was owned by the collective, but the fields were used by individuals. Land was redistributed, perhaps at yearly assemblies, according to rank or social status by societal leaders (Pedersen and Widgren 1998:279–80). It is possible that the right to land was considered a human right in the Pre-Roman Iron Age (even though not all homo sapiens were considered humans), perhaps distributed to couples establishing a home. The rights to land thus had both individual and collective features. It was not the right to land or property that gave status, but status that gave the right to land (Herschend 2009:170, 277; Gjerpe 2017:190). When each individual farm plot was reused for centuries, the landscape became fixed, and the fields were in use for a long time, resulting in a stricter regulation of rights to land.

A fireplace that was built in the central aisle in one building at Dilling was dated to the Viking Age, centuries after the abandonment of the settlement, suggesting that the remains of this house were visible and the house area thus not farmed. This may, as our analysis has showed, also be reflected in the process where the house areas were rebuilt after years of abandonment, which may suggest that they were not farmed when abandoned, contrary to what Pedersen and Widgren (1998: 280) suggest. Fences appeared around the farms to mark rights to different resources and obstruct movement between farms. The changes may be a result of changing manure practice and an intensification of animal husbandry aimed at achieving surplus production (Pedersen and Widgren 1998:302). Property and rights of use could from now on pass in direct line through generations within the same social unit (Webley 2008:148–9).

This marks a change from collective rights over land to individual rights, and most likely also changes in inheritance to land (Pedersen and Widgren 1998:303; Webley 2008:148–9). When land was no longer distributed by the community or prominent individuals, leaders lost their functions and power, and some social units may have lost their right to establish a household with associated pastures and arable land (Herschend 2009:216–217). In southern Scandinavia, the process began towards the end of the Pre-Roman Iron Age and was completed around AD 500, when it became possible to own land without living on it (Herschend 2009:258–259, 393). At Dilling and in the rest of Viken county, the practice of building larger houses and of rebuilding houses began as early as the Pre-Roman Iron Age, while in the rest of eastern Norway, as well as in southwestern Sweden, this practice mainly started several hundred years later, around AD 200 (Pedersen and Widgren 1998:301–313; Eriksen 2015:188; Gjerpe 2017:223; but see Meling this volume). It has been argued that the concept of property rights did not take root until Roman times (Hedeager 1990; Herschend 2009; Løvschal and Holst 2014). However, there were clearly already different types of rights to land and boundaries in the Pre-Roman Iron Age at Dilling, reflected in the two types of fixed divisions.

Conclusion

In this paper, we have discussed the settlement organisation at the site of Dilling in eastern Norway in a long-time perspective. In all, 136 buildings were identified. Activity was most extensive in the period between 200 BC and AD 200, while some buildings go back to the early Bronze Age (1500–1100 BC) and the final period of building and other activity date to the Migration Period (AD 400–550). The settlement moved higher in the terrain over time, perhaps due to a general restructuring of the settlements caused by a new way of organising mixed farming, or possibly as a result of a wetter climate. At the same time, buildings were built on new plots of land within the defined house areas. There were two types of boundaries: one between the house areas, consisting of empty space, and the other between individual farms within the house areas, sometimes marked with fences. Clearly, there were already different types of rights to land and of boundaries in the Pre-Roman Iron Age at Dilling.

The enclosed farmyards were around 1000 m^2 in size, which perhaps indicates a certain standardization. The fences testify, in the same way as the houses, to their relatively short lifespan, which changed according to the conditions prevailing at any given time.

After 200 BC the buildings were constructed, repaired and rebuilt on the same individual plot — a pattern of house-building activity being practiced here 400 years earlier than in most parts of Norway — suggesting, perhaps, changes in ownership and more fixed divisions of the landscape at that time. In the years between 150 BC and AD 50, building activity in the small rural community at Dilling may have been managed or regulated in some way from the large building with a hall-room, which would emphasize that socio-economic changes and new notions of ownership of land must have taken place in this period.

The settlement structure, with house areas separated by pieces of land without traces of prehistoric activity, and with rebuilding taking place only on already-used house areas, in some cases decades after the previous building was abandoned, points to some sort of regulation, and possibly to a system of property rights. However, the relatively short life of the hamlet-like structure (200 BC–AD 200) and the ongoing changes hint at regulation being deeply embedded in this local community, and maybe in society in general in larger areas, in this period. Such regulation might have controlled rights to the ownership of land, pasture rights and other aspects of the life of an agricultural community. After AD 200, it might have been a human right to establish one's own farm, and the building of a house for the new household a communal task.

Notes

1. Id is referring to the identification number in the Norwegian Cultural Heritage Database (askeladden.ra.no), and id 74 is short for id 216874 and id 73 for id 216873.
2. The terminals look slightly different, and one is especially corroded, which makes identification difficult. The XRF could not confirm if it was from one torque, or two different torques. One of the terminals looks like a torque from Ryda, Åsen, Västergötland in Sweden (see Sahlström 1948 fig. 10), while the others look more like the torque from Hammerstad, Stange, Innlandet county (previously Hedmark) (see Resi 2011 fig. 6 and 7).
3. A construction with two rows of posts / double posts filled with horizontal branches and twigs (Ethelberg 2000:231).
4. This may also be two succeeding farms with one small buildings.

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“The 207 BC Dust Veil Event” and the advent of iron reaping tools in Scandinavia

Lars Erik Gjerpe

Abstract

Sickles and other reaping tools made of iron were taken into use as late as 200 BC in central Scandinavia, even though iron was known several hundred years earlier. This delay inspires two related questions: why did Scandinavians not take advantage of iron earlier; and why did they start around 200 BC? According to earlier research, this late utilization of iron was due to hostility to new technology. This paper suggests that the acceptance of new technology coincides with a year without a summer, caused by a volcanic eruption or other climatic disturbances in 207 BC. I argue that the bad year caused a scared population to open their minds to new technological solutions. The settlement at Dilling, where excavation results have proved so interesting, was located on the stone-free marine plains where the new iron tool was more effective than on the stony moraine, and the larger amount of fodder each person could harvest made it feasible and possibly desirable to keep cattle close to the settlement, thereby decreasing the use of forests and outfields for grazing. More cattle and possibly a new way to treat the dung made manuring better and the span between fallow periods longer, thereby making it possible or desirable to stay longer at a settlement and to build houses that lasted longer.

Keywords: Pre-Roman Iron Age, technology, climate, agriculture, luddites

Introduction

The acceptance of iron reaping tools in Scandinavia as late as c. 200 BC has been highlighted as an example of delayed introduction of a new technology, possibly a result of successful resistance (Sørensen 1989a; Penack 1993). Iron ornaments, buckles and repairs demonstrate the use of iron in central Scandinavia from c. 500 BC onwards at the latest, possibly as early as c. 800 BC (Levinsen 1983; Sørensen 1989b; Pedersen and Widgren 1998:264). Judged by the amount reaped per unit work invested, iron sickles are far superior to their counterparts in flint, stone or non-ferrous metals. Advanced steel technology is no requirement, for scythes may be made of soft iron (Stigum 1938), while iron extraction sites dated to c. 500–300 BC demonstrate both the presence of the necessary know-how and access to large quantities of the metal (Larsen 2013:60; Simonsen and Bukkemoen 2015).

In spite of this, Scandinavians did not make iron reaping tools before c. 200 BC (Penack 1993; Myhre 2002:110; Gustafson 2016), demonstrating that technology is a cultural phenomenon embedded in society (Dobres 2000). The acceptance of new technology is not merely a result of individual cost-benefit-analyses, it is as much about ideology and social

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organization (Leeuw 1989; Layton 2000; Juma 2016). This delayed use of iron as a raw material for reaping tools leads to at least two related questions: why did Scandinavians not take advantage of iron earlier; and why did they start around 200 BC? During the ongoing study of the newly discovered settlement at Dilling, Østfold, in eastern Norway, we noticed evidence of intensified activity that could be dated to c. 200 BC, roughly at the time when iron sickles were taken into use. In my quest for an explanation for the two possibly concurrent and related incidents, I discovered a third contemporaneous happening, a dramatic change in temperature. Thinking with two sets of data, the Pre-Roman Iron Age settlements at Dilling and the climate and weather, both set in the general frame of the Pre-Roman Iron Age (500–1 BC) of eastern Norway, I will here explore the introduction of iron sickles. As demonstrated by Marie Louise Stig Sørensen (1989a), the highly conservative members of Early Pre-Roman society did not easily accept new influences, and my hypothesis is that they were scared straight[1] in c. 200 BC due to a climatic event.

Background

In the course of the last 15–20 years the concept of weather and climate causing change has once again gained acceptance (Moreland 2018; Gundersen 2019), notably through the Fimbulwinter theory or the "Dust Veil Event" of AD 536 (Gräslund 2007; Gräslund and Price 2012). Most scholars seem to agree that volcanic eruptions and subsequent dust veils caused years without summers, and with falling temperatures, resulting in crop failure and subsequent famine. The most dramatic events may have been in AD 536–541, but the average summer temperature in the period c. 536–650 was most likely the lowest in the preceding 2000 years, probably causing several bad years and low yield in the Northern Hemisphere. This period, labelled the Late Antique Little Ice Age by some, coincides with societal change reflected in material culture as well as written sources (Wiker 2001; Gräslund and Price 2012). This coincidence has caused archaeologists and historians alike to regard the temperature as a prime mover or agent causing change (e.g., Eisenberg *et al.* 2019), although some have pointed out the problems related to establishing whether cause-and-effect relationships can be deduced from coincidences in time, and the challenges of precisely relating dates of natural and cultural phenomena (Moreland 2018; Gundersen 2019). Others have pointed out that some of the changes are more likely to have been long-term changes originating in societal upheavals in the fifth century and that some even occurred prior to the event (Amundsen and Fredriksen 2014; Fredriksen *et al.* 2014; Ystgaard 2014; Gjerpe 2017; Røstad 2021).

Terms such as "catastrophe" and "disaster" are appropriate with regard to the aftermath of 536, and it seems beyond doubt that many died of starvation. Stories of catastrophes may become part of myths and legends (Cashman and Cronin 2008), as with the well-known myth of the Fimbulwinter (Gräslund 2007), and may also cause rituals to change (Axboe 1999). Catastrophes might also change the mentality and open for the introduction of new technology in an otherwise conservative society (Torrence 2016). For example, Birgit Arrhenius (2013) has demonstrated how rituals at Helgö moved indoors and burial grounds were re-located post-536. Daniel Löwenborg (2012) has revealed how a "kleptocracy" used the shock and chaos of these years to gain control over the valuable farmland in the Mälaren valley. Thus, the event not only caused demographic disaster, it also triggered cultural change.

I do not argue in favour of environmental determinism or mono-causality, for I acknowledge that an intricate socio-ecological system shapes societal response to environmental change or shock and that weather is a material condition embedded in social and cultural formation (Butzer and Endfield 2012; Pillatt 2012; Manning *et al.* 2017; Ljungqvist *et al.* 2018). To me, the lesson learned from the 536 debate is that "bad weather" could trigger mental and ideological change. The aim of this paper is to explore if similar natural events made iron reaping tools acceptable around 200 BC, while still acknowledging the underlying economic and political forces. Through Gräslund's work, the low temperature period 536–541 is now widely accepted as the historical background of the Fimbulwinter and I will investigate if this insight might be of relevance for the understanding of the earlier event. In fact, the myth was actually pinned down to the Pre-Roman Iron Age. Rutger Sernander (1910) suggested that the strictly limited archaeological evidence of the Pre-Roman Iron Age was due to a severe temperature fall causing population decline, and claimed this was the origin of the Fimbulwinter myth. His interpretation has gained little support from archaeologists (Wangen 2009:47; Dæhlen 2011; Gundersen 2019). Still, with the agency of weather and climate now acknowledged, it is worth exploring the basic idea again: did extreme weather cause a conservative mentality to change around 200 BC?

A framework for my discussion is resilience – the ability to survive and cope with a disaster (Cutter *et al.* 2008:600). The term is given a variety of meanings and is righty criticized for being vague, but is still a part of the discourse on disaster relief (Barrios 2016:29). It is a measure of how societies handle stress and crisis, and provides a way to understand why stable societies change, and the role of change (Redman 2005:72). Different societies may react in diverse ways to an accident. A society considering a flood the act of angry or vindictive gods reacts in another way than a society regarding it as the result of badly kept floodgates (Ebert 2018). The former society might placate the gods, while the latter might build better floodgates. Disasters are assessed according to how they influence human life, health, property, economic activity and other matters we care about, and are therefore social phenomena, as the example of the badly kept floodgates demonstrates (Shimoyama 2002:20; Dominey-Howes 2018:7). All kinds of societies are a mix of stabilizing forces in support of production and memory, while destabilizing forces are important for flexibility and innovation. Change might be a result of a sudden release of an accumulated stimulus, and flexible or resilient societies might handle the burst dam quite well. Not all seemingly dramatic climatic changes result in disasters. On the contrary, studies suggest that climatic change results in disaster only if political, social or economic circumstances allow it (Butzer 2012; Ljungqvist *et al.* 2018). A resilient society handles a potential disaster by changing and adapting to new conditions or by simply absorbing the shock (Birkmann *et al.* 2010). Disasters such as the Black Death and the 536 Dust Veil Event killed a lot of people, but also led to ideological change and mistrust of leaders (Herlihy and Cohn 1997; Arrhenius 2013). I will explore if a hitherto little acknowledged bad year in 207 BC may have been another catalyst for change by opening people's minds to new ideas and to the acceptance of new technology (Sørensen 1989a).

Temperature and precipitation in Pre-Roman Iron Age in eastern Norway

First, I will introduce the climate of the Pre-Roman Iron Age in eastern Norway. Due to local variations and to methodical and source critical considerations it is hard to be detailed. However, Rolf Sørensen *et al.* (2015) have adapted a summer temperature curve from Setesdal, southern Norway, to Ås, in the county of Akershus in eastern Norway, c. 30 kilometres from Dilling (fig. 1). In all likelihood, the climatic condition for cereal farming gradually worsened from c. 300 BC onwards, with colder and wetter summers, and with a severe temperature fall around 200 BC (Sørensen *et al.* 2015). As the conditions for cereal production in Scandinavia are marginal, even small changes for the worse could make a bad year (Stamnes 2016). The temperature fall around 200 BC is actually larger than the better explored fall around AD 536, widely acknowledged as disastrous. Similarly, a temperature curve from Gudbrandsdalen, in Oppland county, illustrates a dramatic temperature fall around 200 BC, showing lower summer temperatures in the two last centuries BC than in the 6th century AD (Nesje *et al.* 2016). Other studies suggest the temperature fall around 200 BC compares to the Late Antique Little Ice Age in other ways too. The Irish summer of 207 BC was so cold that the growth rings of oak trees evidence frost damage as severe as after 536 AD (Baillie 1992, 1995:fig. 5.2, 2007). German oak growth rings demonstrate a cold period from 208 to 204 BC, while Californian growth rings evidence frost damage in 206 BC (Baillie 2000:64–65).

The written evidence of the 207 BC cold period is of course even more scarce than that of AD 536. Still, they tell similar stories. Italian observations tell of a halo around the sun – when visible, the sun was red and there was abnormal daylight (Forsyth 1990). In northern China no stars could be seen in three months, and bad years resulted in starvation (Stothers 2002; Baillie 2007). This matches the descriptions of the AD 536 disaster and is consistent with the optical characteristics of volcanic eruptions (Robock 2000). I would therefore suggest that the bad year 207 BC was due to an eruption from an unknown volcano or possibly a comet impact (e.g., Baillie 2007; Manning *et al.* 2017). Richard Warner (1990:32), somewhat controversially, suggested that mythical notes in the Irish Annals on high cattle mortality actually refer to historical incidents in the years 209–199 BC (for critique, see Mallory 1993:18), and it has, moreover, been suggested that a volcanic eruption in 207 BC sparked rebellions in Egypt (Manning *et al.* 2017). All in all, evidence, albeit circumstantial, suggests that the year 207 BC was a bad year without a summer, probably caused by a volcano eruption (or comet impact, or possibly other climatic disturbances). Due to the similarities with the AD 536 event I will label the Pre-Roman Iron Age year without a summer the "207 BC Dust Veil Event". The temperature curves from Ås and Gudbrandsdalen aim to shed light on temperature over a long period, not to illustrate the incidents of 207 BC or AD 536 specifically. This may make the dating of the temperature fall appear more accurate than it is. Still, they illustrate that the Late Antique Little Ice Age is not the only Iron Age cold period. Just as in AD 536, a long period with lower summer temperatures is aggravated by one year "without a summer". Although the 207 BC event is less explored, the low summer temperature in 207 BC was probably brought about by an incident in some respects comparable to the event in AD 536 (Chambers 1993:252). In a period with a cold and wet climate, one summer when trees suffered frost damage, and when the harvest failed and the sun was less visible than ever before, must have been a shock – regardless of the cause – and must have given rise to hopelessness and desperation.

In addition to the temperature curve, a ^{14}C-dated pollen diagram from Ås allows us to single out known disasters such as the 536 Dust Veil Event and the Black Death, along with the less studied 207 BC event (Sørensen *et al.* 2015). All three were followed by enhanced levels of pollen from trees and bushes and a decrease in cereal and herbs related to agriculture – fields and pastures seem to be recovered by forests. Evidence from pollen diagrams and temperature curves thus indicates that the effects of the 207 BC event had much in common with the effects of the 536 event and the Black Death. Pollen studies from other parts of

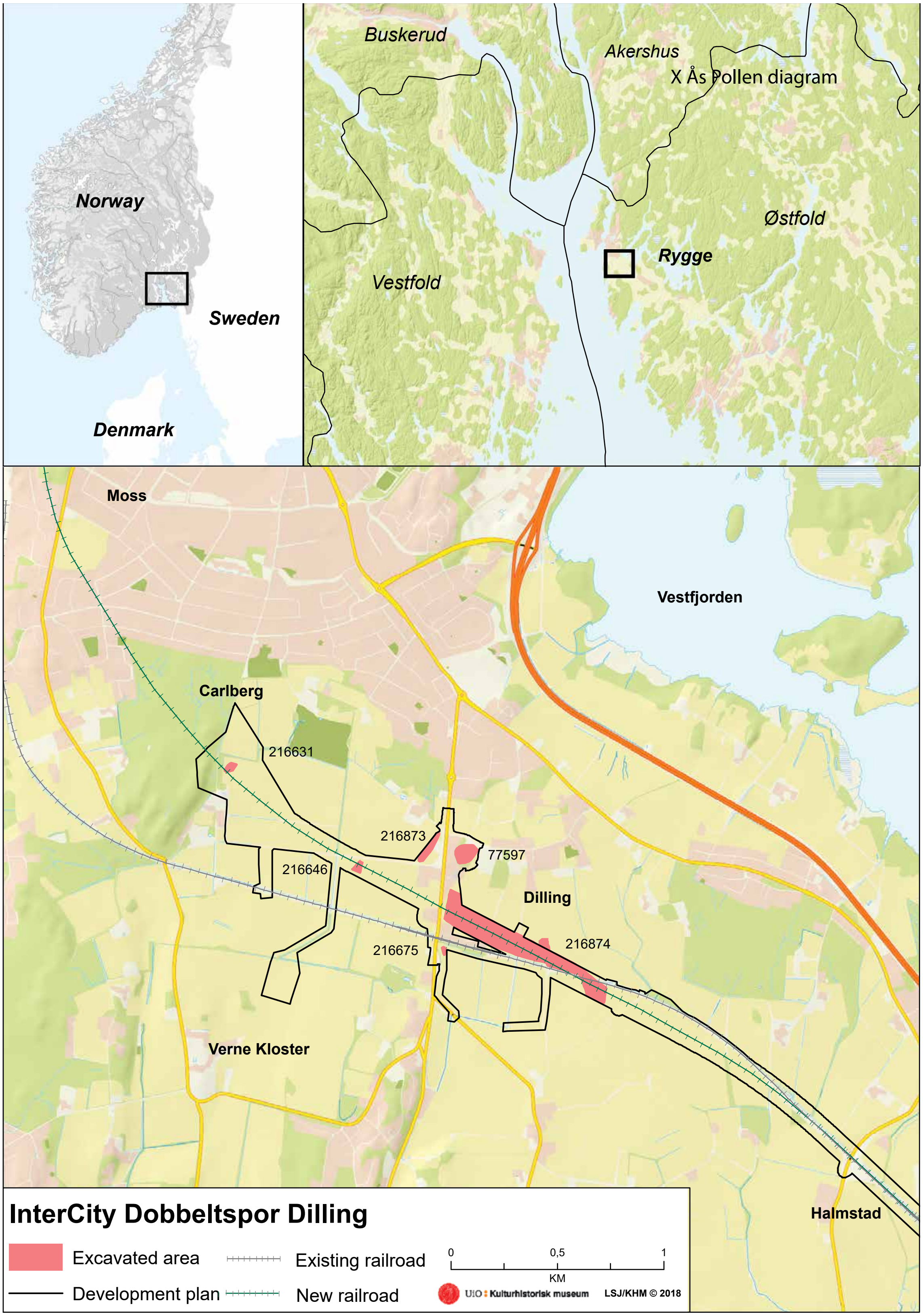

Figure 1. The position of the main site at Dilling (216874) and location for the pollen diagram from Ås. Illustration: Linnea Syversætre Johannessen.

Scandinavia also indicate similar tendencies: decreased pollen from cultivated plants and increased pollen from trees, indicating reforestation from c. 200 BC onward (Berglund and Tesch 1991; Pedersen and Widgren 1998:30, 48–49, 178; Myhre 2002:19; Ekman 2004:128). The climatic preconditions for cereal-growth probably became less favourable from c. 300 BC to c. 1 BC, and hostile in 207 BC. Most likely the 207 BC event resulted in a single bad year, as opposed to the AD 536 event which caused two or several disastrous years and possibly decades with depressed temperatures (Baillie 2000:79; Toohey *et al.* 2016). Still, it is highly likely that the cold summer caused the harvest to fail and a shortage of leaf, grass and other fodder plants. The settlement at Dilling was established sometime in the third century BC, and flourished from c. 200 BC to AD 150– the period where paleoclimate research suggests agriculture declined (fig. 2). There has been little focus on the "207 BC Dust Veil Event" in Scandinavian archaeology, even if some have suggested that the cold period and the subsequent bad years influenced the settlement pattern in Denmark or caused Germanic migration eastwards (Konstantin-Hansen 2013 with references; Nielsen 2015). It is therefore underexplored if or to what extent the 207 BC event affected the settlement pattern in Scandinavia. As different kinds of society react differently to challenges, I will outline some fundamental characteristics of eastern Norway at the transition from Early to Late Pre-Roman Iron Age, before I go on to the Dilling site.

What kind of society met the "207 BC Dust Veil Event"?

Our perception of the Pre-Roman Iron Age has changed radically since the early 1900s when Sernander and other researchers found poor evidence for settlement and peopling. Methodological innovation, e.g., the ^{14}C method (dating of cremations with limited grave goods), top soil stripping (finds of houses and diverse evidence of settlement), and paleoclimate research have all provided a larger body of evidence from eastern Norway (Løken 1974; Rødsrud 2012; Sørensen *et al.* 2015; Skogstrand 2016; Gjerpe 2017; Solheim and Iversen 2019; Gundersen *et al.* 2020; Mjærum 2020). All in all, as a consequence of a new look at old evidence, the period is now considered dynamic (Bergsvik 2006; Dæhlen 2011). The Pre-Roman Iron Age is no longer divided in three (e.g., Becker 1961), but into Early (500–200 BC) and Late (200–1 BC), based on burials and artefacts (Pilø 1989; Nybruget and Martens 1997; Jensen 2005). Cremation with few or no grave goods and no (preserved) monuments is the predominant burial custom, even though some monuments and richer grave goods do occur (Johansen 1955; Nybruget 1978; Nybruget and Martens 1997; Rødsrud 2004; Wangen 2009; Gustafson 2016:32–45). The graves appear egalitarian when compared to the Late Bronze Age and Early Roman Period, even though some express prestige. Most graves are situated in or close to fields, but rarely on settlement sites themselves (Ragnesten 2007; Gjerpe and Østmo 2008; Meling 2017). The number of richly furnished graves increases around c. 200 BC, and graves with weapons are interpreted as evidence of the rise of an independent military organization (Martens 2008, 2011).

Mixed farming was well established as the main subsistence strategy in Scandinavia by the end of the Bronze Age (Pedersen and Widgren 1999; Myhre 2002; Jensen 2006), while the three-aisled building with separate rooms for humans and animals was the main farmhouse from c. 1500 BC until the Viking Age (AD 800–1050). Cattle, sheep, goats and horses were the customary farm animals, and wheat and barley the conventional cereals, supplemented by oat and rye, especially in southern Scandinavia. While Early and Middle Bronze Age society was hierarchical, and socially and economically stratified (Kristiansen 1998), Late Bronze Age and Early Pre-Roman Iron Age society was less stratified and more egalitarian, prompting Ulf Ragnesten (2007:3) to name it "the people's century". Understanding pre-disaster political strategies is the key to understanding post-disaster conflict (Peregrine 2019). According to archaeologists and historians alike, egalitarian societies are more resilient than polarized or hierarchical societies: "equality in the distribution of property and power was a vital component in pre-industrial societies' capacity to deal or recover from crisis" (Curtis 2014:270; see also Peregrine 2018). This being the case, an accident could cause Pre-Roman Iron Age society to innovate or change rather than collapse, probably reallocating resources and creating winners and losers in the process, sometimes benefiting the pre-disaster elite, and in other cases overturning them (Izdebski *et al.* 2018).

Dilling: settlement, sickles, and the "207 BC Dust Veil Event"

The material I use to explore the possible change of mentality and practice is from one of the largest excavated prehistoric settlements in eastern Norway, recently discovered at Dilling, Østfold (Ødegaard *et al.* 2017; Gjerpe 2019, *in prep.*; Ødegaard *et al.* this volume). There was sporadic activity here from the Bronze Age to the Viking Age, with continuous settlement from c. 300 BC to AD 200, flourishing from c. 200 BC to c. 150 AD (figs. 6.1, 6.2). Four to six farms within a distance of 800 metres were settled at the same time as a cremation burial site was used. As in the rest of central and southern Scandinavia, mixed farming was the main source of calories. Wheat and barley were the main crops at Dilling, and even though preservation conditions did not favour bones, it seems safe to suggest that cattle, sheep and goats, and possibly horses, were the main farm animals. The site lies on the

Burial nr.	Dated material	Dated material	Laboratory number	Date BP	Standard deviation	Calendar year 68%	Calendar year 95%
5201	Cremated bone	Cremated bone	Beta 470032	2030	30	88 BC–AD 20	156 BC–AD 53
	Charcoal	Charcoal Aspen/*Populus* or Willows/*Salix*	LuS 13114	2055	40	152–2 BC	178 BC–AD 47
5582	Cremated bone	Cremated bone	Beta 470031	2090	30	163–56 BC	195–42 BC
	Charcoal	Charcoal Birch/*Betula*	LuS 13123	1995	40	41BC–AD 52	106 BC–AD 85
9629	Charcoal	Hazel/*Corylus*	Ua 58229	2082	*30*	*159–52 BC*	*192–5 BC*
	Cremated bone	Cremated bone (Human)	LuS 13923	2050	40	111 BC–AD 2	174 BC–AD 49

Table 1. ^{14}C-dates from cremation graves with sickles at Dilling.

transition between the Ra, the largest terminal moraine in Scandinavia, and the marine silt and clay plain. From the settlement there was access to both the wetter clay plains and the dryer moraine. The settlement at Dilling has been thoroughly excavated and well dated. Due to trial trenching in a c. 100 metres wide and several kilometres long east-west development plan, the settlement has been defined in all directions except to the north and southeast. Trial trenching also revealed remains of activity in the landscape surrounding the settlement, such as cooking pits. Dilling is, then, well suited for a study of human interaction with topography, soil and climate. It also offers a suitable opportunity for studying early use of iron sickles, as three Pre-Roman Iron Age sickles were found there.

Lack of evidence for Scandinavian iron reaping tools prior to c. 200 BC is of course not evidence of absence – conservation of iron objects on settlement sites is poor and their presence in graves or depositions depends on custom. As of today, no reaping tools of any material are known from the Early Pre-Roman Iron Age of eastern Norway. However, other kind of tools were made of flint and stone, and I suggest the lack of reaping tools owns much to investigation. Pressure-flaked flint arrowheads from eastern Norway are dated as late as AD 200 (Mjærum 2012), and pressure-flaked tools were used in agricultural settings in western Norway through the whole Pre-Roman Iron Age (Bergsvik 2006). In southern Scandinavia the use of flint and stone tools continued throughout the Iron Age (Knarrström 2000, 2006). It is hard to link cutting stone or flint tools to Iron Age farms in eastern Norway, probably due to source critical problems – as archaeologists tend to interpret small finds of flint in Iron Age farm contexts as redistributed from Stone Age settlements. Some flints collected from Iron Age house grounds in western Norway have been interpreted as chippings, possibly from production of fire flint (Petersen 1933; Randers 1981). Flint blades have been found in Iron Age contexts such as graves, but are mostly interpreted as accidently redistributed or as antiquities used as memorabilia to create bonds to the past (Gjerpe 2008; Thäte and Hemdorff 2009; Reitan 2016). The scarce and little studied material makes it difficult to conclude whether people were still making reaping tools of flint or stone in the decades leading up to c. 200 BC, but circumstantial evidence suggests they might have been, and that the lack of iron tools is real and not due to poor preservation or depositing customs.

In eastern Norway, few iron sickles date to the Pre-Roman Iron Age. The cause of this may be a lack of precise typology, few graves dated by ^{14}C, and burial custom – however, it probably mirrors a scarcity of iron sickles. In this context, the three recently excavated cremations with sickles at Dilling are noteworthy. Two samples from each are dated (tab. 1). The results point to a Late Pre-Roman Iron Age date or possibly the first 50 years of the Roman Iron Age. The three sickles from Dilling can consequently be counted among the sickles – less than ten in all – from the Pre-Roman Iron Age of eastern Norway (Nybruget 1978; Gustafson 2016). All in all, evidence suggests reaping tools were made of other materials before c. 200 BC, and that it was around 200 BC that they were replaced by iron tools.

In general, there seems to be continuous settlement at Dilling from c. 300 BC, with a village-like structure in the period c. 200 BC–AD 150. The buildings are dated with one or more ^{14}C-dates of cereals or charcoal from postholes, fireplaces or other structures interpreted as a part of the building, and in some cases from (horizontal) stratigraphy (Gjerpe *in prep.*). As calibrated ^{14}C dates often cover many calendar years, dates from one house may cover several hundred years, even though a three-aisled building with dug down posts probably stood for less than 200 years or even as short a time as a few decades (see also Lindell this volume). This makes it hard to define how many buildings stood at Dilling in the third century BC. Eighteen buildings have dating that spans the third century, while all but three of them span well into the second century or later. From c. 200 BC to AD 150/200 the settlement flourished, with 86 of 98 dated buildings spanning parts of that period. Only four buildings are erected on the plain after AD 200, all within a small area. Most activity on the other areas ended around AD 150/200. The summed probability distribution of ^{14}C-dates also supports the assumption of

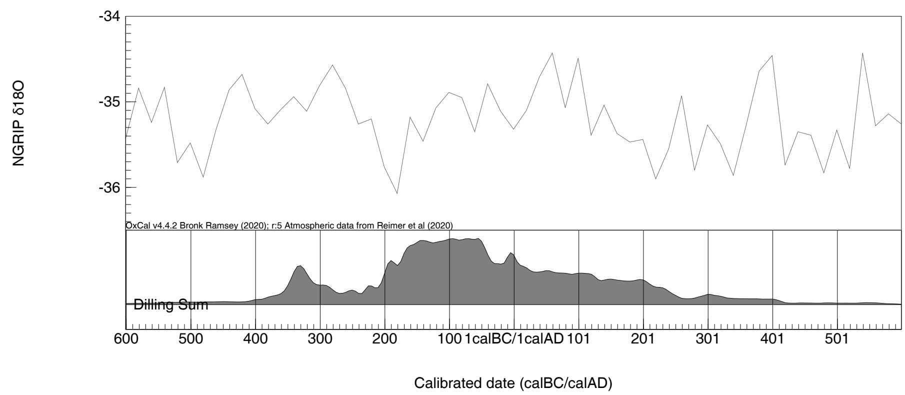

Figure 2. SUM of probability based on 499 ^{14}C dates from the Dilling settlement site (Gjerpe *in prep.*) and the NGRIP ice core δ18O record, a proxy for temperature on Greenland (Jouzel *et al.* 1997). Calibrated by OxCal v4.4.2 (Bronk Ramsey 2009), atmospheric data from Reimer *et al.* (2020). Note the steep rise of the SUM curve c. 200 BC. The "horn" c. 340 BC is probably a result of the gentle slope or plateau of the calibration curve, and does not reflect high activity. The ^{14}C dates are from Gjerpe *in prep.*

sporadic settlement on the Dilling plain before 300 BC, then continuous activity starting in the third century BC and flourishing from 200 BC to AD 150/200 (fig. 2). Thus, the activity at Dilling actually peaks at a time when temperature curves and pollen diagrams suggest low activity in eastern Norway.

This also coincides with another change. From c. 200 BC the use of isolated cooking pits in the outfields pauses at Dilling and decreases in the rest of eastern Norway and in parts of Sweden (Petersson 2006: fig. 107; Streiffert 2012:27; Persson and Reitan 2014: fig. 11.17, 14.7.10; Solheim 2017: fig. 5.2; Viken and Reitan 2019: tab. 1.7.3). Lone cooking pits in the outfields are interpreted as meeting places for herders to negotiate rights to pastures, but may also have offered heat for herders spending the night outdoors (Petersson 2006; Munkenberg 2015; Meling this volume). The end of this practice suggests either that pasture rights were no longer negotiable or that pastures were no longer used. Pollen diagrams favour the latter interpretation, and consolidated evidence suggests the outfield pastures were no longer important. Analysis of soil samples suggests that dung accumulated at the settlement site of Dilling indicates that cattle were held close to the site, not far away in the outfields (Macphail *et al. in prep.*). It therefore seems the new technology was roughly contemporaneous with economic and societal changes around 200 BC, and had a cause-and-effect relationship to them.

Luddites and cultural pessimism in Pre-Roman Iron Age

Resistance to technological innovation is to be found throughout time and in various places. The Luddites were an organization of textile workers who, in England early in the 19th century, destroyed textile machines, as they feared the time spent to learn their trade would go to waste (Jones 2006). Today the term refers to anyone who opposes technological development, often because they fear that new technology will make their skills and know-how irrelevant or redundant, and lead to them losing their manual jobs (Jones 2006). Cultural pessimists on the other hand fear that new technology somehow will "turn upon us", causing social upheaval and society to change for the worse for those benefiting from the current situation (Spengler 1988).

Lauriston Sharp's (1952) ethnographic study of the introduction of steel axes to, in his words, "stone age Australians" might substantiate cultural pessimists' fear of new technology. The Yir Yoront people centred their economic, cultural and social life around the stone axe, which was a totem, a symbol of masculinity and (older) men's dominance, as well as a good and functional tool to cut firewood or conduct other tasks, whether quotidian or rare. Only adult men could own stone axes, although women, youth and children used them in daily tasks, including collecting firewood. They had to ask an older man to borrow his axe, an act confirming his rightful dominance. Then "a snake" entered the paternalistic paradise – the steel axe. Christian missionaries started to give steel axes as gifts to Yir Yoront women, children and sometimes men, without being aware of the societal consequences. Men now had to ask women or children to borrow the more effective steel axes, an act which undermined the traditional pattern of male authority among the Yir Yoront people and gave the hitherto subordinate women and children more independence. The steel axe challenged gender roles and the social order more broadly, in the end causing the Yir Yoront culture to collapse, or at least radically change. As the new technology was not compatible with the institutional or ideological base, authority was redistributed in new ways (Iyigun and Rubin 2017).

The study demonstrates how resistance to new technology such as steel axes or iron sickles might be rational for those who might lose social or economic control or influence. In the Pre-Roman Iron Age hostility to more efficient sickles might have been rational for "the last Bronze Age Men" benefiting from male domination (cf. Kristiansen 1998, 2004). Luddism by proxy – the fear of what other people might do when they get too much spare time – the devil finds work for idle hands – is a form of cultural pessimism also known in the last centuries BC. Hellenistic society regarded slaves as both essential to production and as a potential threat (Green 2007:76). To keep slaves fully occupied with manual labour was a way to pacify them, inflicting a reluctance to accept labour-saving technology.

Further north, society in eastern Norway seems not to change much during the Early Pre-Roman Iron Age, and may fairly be described as conservative and reluctant to change. A long time passed from the introduction of iron to activation of its potential (Levinsen 1983). As Sørensen (1989a) has pointed out, the time lag was ideologically justified. The Iron Age economy was embedded in other values than that of maximizing production (Gjerpe 2017) and the Iron Age farmer was not a rational economic actor aiming for increased prosperity. New is not always better, and technological innovation is not always immediately socially important (Sørensen 1989a). It seems like iron was not regarded as an alluring metal in the Late Bronze Age and Early Pre-Roman Iron Age. Tradition and conservatism led to resistance to new materials and to a late acceptance of iron as a raw material for tools (Sørensen 1989a; Kristiansen 1998:156). This mentality changed around 200 BC.

People scared straight and cultural pessimists proved right

Against this background we can now return to our other main question: why were iron tools accepted around 200 BC? The previous paragraph discussed general issues relating to delayed acceptance of technical advances being caused by mental and ideological conservatism. Now we must check out the chronology of developments at the Dilling settlement in eastern Norway. The precision of the dating, as far as it goes, does seem to suggest a chronology that indicates that the acceptance of iron tools followed a bad year. I argue there is a causal link. However, I do not suggest that the 207 Dust Veil Event forced or caused the use of iron reaping tools. I argue that the bad year and the subsequent hunger, on top of the stress accumulated over decades of worsening conditions for cereal-growing, must have caused a resilient society to consider alternative ways of thinking and living.

The shock and awe following the 207 BC event reminded this conservative society that the world was changing, and removed a mental block, making way for the acceptance of new ideas and available technology. The direct consequence of the new technology in the form of iron sickles was higher output per work unit – a person could collect more fodder or cereals. While the Yir Yoront used the higher productivity of new technology to sleep more (Sharp 1952), the central Scandinavians used it to stay closer to home. Iron sickles made it possible to collect a larger amount of fodder; consequently, animals could be kept closer to the settlements. Pollen analysis implies reforestation, and the lack of cooking pits in the outfields from around 200 BC and for two centuries or so suggests there was no conflict related to grazing in the forest in this period.

The iron sickle must have been better suited to collecting plants on the stone-free marine clay plains free than on the stony moraine. At the same time as the animals were kept closer to the settlements, dung was treated in a new way, resembling "plaggen soil" (Macphail *et al. in prep*.). Increased quantity and possibly also quality of the manure made better manuring possible, resulting in higher yields and the possibility to cultivate the same field longer before leaving it fallow. The new manure management and need for dung made it desirable or necessary to keep the animals close to the settlement so that dung could be collected.

The direct and economic effect of the use of iron sickles was the opportunity to keep more cattle stabled, demanding increased access to winter fodder and larger buildings from c. 200 BC. In the Early Roman Period the combined dwelling and byre houses became smaller, but more outhouses may compensate (Ødegaard and Winther *in prep*.). A larger number of stabled cattle, possibly grazing close to the settlements and fields, gave better access to manure, resulting in higher yield. It is hard to separate the direct from the collateral effect of something decided more than 2000 years ago. Still, introduction of a new technology had unintended effects (Rogers 2003). Manuring and more extensive periods of cultivation without fallow made it possible or desirable to stay longer at the same place and in the same house. For that reason the houses were built more solidly or repaired (Bukkemoen 2015; Gjerpe 2017). When the activity in the outfields was reduced, it was not because of a general downturn, but because labour input was re-allocated to the settlement (Herschend 2009:20–25).

One of the collateral consequences might have been a change in gendered social and economic status. Geir Grønnesby (2019) has suggested that the division of labour was gender-based in the Pre-Roman Iron Age: greatly simplified, he suggests men raided and herded while women cultivated cereals. The new manuring regime and new tools must have raised the economic and social status of the users, as well as their productivity. If graves are dialogues with the gods (Kaliff 2007:84), then much of the conversation must have centred on harvesting, as sickles are one of the few types of tools in graves from the Late Pre-Roman Iron Age. Sickles might also be a symbol of food supply (Pedersen and Widgren 1998:357). At any rate, the importance of sickles is demonstrated by their being one of only a few categories of tools present in Late Pre-Roman Iron Age burials, and the lack of male graves with sickles might support Grønnesby's suggestion.

Conclusion

Inspired by the AD 536 Dust Veil Event discussion and historical and anthropological research, I have applied resilience theory to investigate the acceptance of the iron sickle around 200 BC. Tree-rings and sparse written sources indicate a volcanic eruption or other climatic disturbance in 207 BC causing one year without a summer, by me labelled the "207 BC Dust Veil Event". I have argued that the event scared the Pre-Roman Luddites of eastern Norway straight, and made a conservative but resilient society accept new technology in the form of the iron sickle. I have also demonstrated that the iron sickle, like other types of new technology, had both intended and collateral consequences. The iron sickle made it possible to harvest more cereals and fodder per work unit. The larger amount of fodder made it possible to keep more farm animals closer to the settlement, thereby increasing the amount of dung available for manuring. Better manuring made it possible to cultivate the fields longer without fallow periods, which again made it possible or desirable to stay longer at the same place, and therefore made it rational to build more solid houses. The larger amount reaped per work unit also increased surplus, allowing a more hierarchical society to develop. Sickles from the Pre-Roman Iron Age are mostly found in female graves, possibly reflecting the female involvement in cereal cultivation and fodder collecting, and the new technology may have altered the social and economic status of the users – probably for the better. Pollen diagrams indicate reforestation in eastern Norway as well as the rest of Scandinavia from c. 200 BC. As the settlement at Dilling was established around c. 300 BC and flourished from 200 BC to c. AD 150, I have argued that reallocation of resources from the outfields to the infields closer to settlement, rather than population decline, caused the reforestation.

Notes

1. The term «scared straight» refers to programs designed to scare young people into law-abiding citizens by exposing them to the consequences of the "wrong" choice (e.g., Thompson et al. 2009). I believe the term is a satisfactory description of how a disaster may scare people into ways that in retrospect may be considered the straight way.

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Uncovering population dynamics in Southeast Norway from 1300 BC to AD 800 using summed radiocarbon probability distributions

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Abstract
By way of deploying a newly generated database with radiocarbon dates from southeastern Norway, we show the strength in using aggregated archaeological data. This approach provides us with the ability to look past individual cases and expose general patterns and provide insight that is difficult to attain at site scale. By analyzing 7.168 dates in a summed probability distribution, we infer temporal variation in population size from the Bronze Age to the Middle Ages. We direct focus towards two important population events: The first is a long-lasting growth phase, beginning in the 5th century BC and lasting until the 5th and 6th centuries AD, likely initiated by technological improvement in agricultural techniques and clearance of new land. The second event is the abrupt decline in the 5th and 6th centuries AD. While we recognize the local and regional differences in responses to the processes taking place in the 5th and 6th centuries, our data allows us to identify overall patterns, across regions and types of archaeological features and sites. We have identified an inter-regional decrease in the radiocarbon data in the mid-6th century, corresponding in time with two major crises in the AD 530–540s – a double volcanic eruption and an outbreak of the bubonic plague.

Keywords: Demography, radiocarbon dating, summed probability distribution, prehistoric population, Scandinavian Bronze Age, Scandinavian Iron Age

Introduction
Many excellent archaeological studies are based on single sites or artefacts. However, analyzing large data sets can give us insight into social processes and development that small-scale data are not able to provide. In this paper, we take advantage of a recently collected dataset of more than 7.000 radiocarbon dates sampled from archaeological contexts, covering Southeast Norway. We use this to infer temporal variation of population size and human activity from the Bronze Age to the Middle Ages (c. 1300 BC to AD 1500).

The use of summed radiocarbon date probability distributions (SPD) is the most widely used archaeological proxy for paleodemographic studies (French *et al.* 2021 with references) although alternative approaches, such as Kernel density estimate, have also proven their value (e.g., Ramsey 2017). This approach provides a top down perspective

In *Complexity and dynamics. Settlement and landscape from the Bronze Age to the Renaissance in the Nordic Countries (1700 BC–AD 1600)*, M. Ødegaard and I. Ystgaard (eds.), pp. 99-112. Sidestone Press, Leiden.

and the ability to study long-term developments, as well as identifying patterns in the archaeological record that are not visible in smaller data. At the same time, it enables us to shift scales and zoom in and investigate detailed events on the spatial and temporal level.

Similar to other archaeological proxies, radiocarbon dates and the summing of dates have biases such as the size of the data set, sampling bias and research foci, taphonomy, the effect of the calibration curve as well as degree of mobility vs. sedentism (Williams 2012; Freeman *et al.* 2018; Timpson *et al.* 2021). Several works have attempted to address such deficiencies. A model testing approach developed by Shennan *et al.* (2013) and Timpson *et al.* (2014) made it possible to move away from visual interpretation of summed data to a modelling of population (Timpson *et al.* 2021:2). This was further developed by Crema *et al.* (2016) to statistically compare two or more datasets, making inter-regional comparison more robust. The development continues and recently Timpson *et al.* (2021) published a new method to analyze demographic patterns by combining a piecewise linear model and formal model comparison (see also Crema and Shoda 2021). In addition to methodological development, the principles of an open science framework especially through sharing of open source statistical packages and datasets have driven research on the field forward (French *et al.* 2021).

If we accept the basic premise of a relationship between quantities of radiocarbon dates and intensity of past population or activity (Rick 1987; Freeman *et al.* 2018), using radiocarbon dates as data has several advantages. Dates are easily available and continually increasing in numbers, and by using proper methods, they are comparable across time and space. This has led to several studies using dates as data-approach to investigate paleodemographic patterns across regions and time (Armit *et al.* 2013; Shennan *et al.* 2013; Silva and Vander Linden 2017; Lawrence *et al.* 2021).

Few studies have used radiocarbon data to investigate the long overarching development in the Iron Age of southeastern Norway, which is the temporal and geographical focus of this paper. The studies produced have been focusing on smaller regions, specific contexts or specific archaeological features, but have highlighted a promising potential for using the dates as data approach for the Iron Age in the region (Solheim and Iversen 2019; Gundersen *et al.* 2020; Mjærum 2020; Solheim 2021; ter Schure *et al.* 2021). Here we take advantage of recent methodological development as well as a larger dataset compared to previous studies covering Southeast Norway.

This paper has two main aims: First, we will demonstrate the potential and the exploratory power of using radiocarbon dates as data in this region by applying proper methods and a newly aggregated radiocarbon data set. Secondly, we will discuss population dynamics and investigate how and if increasingly intensive farming, as well as climate events, and more specifically the mid-6th century crises, affected the population pattern.

Population dynamics, agriculture and environmental change

Population density and fluctuations are fundamental in shaping human societies, and can be both drivers for, and outcomes of change. Populations react to a variety of internal and external factors; however, the degree of food availability or production is essential for population growth. This is a basic principle in the theory argued by Thomas Malthus (2007 [1798]). He maintained that a population would increase and grow more rapidly than its food supply. Eventually, a rapidly growing population would reach it's carrying capacity – the maximum number of people it could sustain – and then the population would drop, leading to economic distress and famine, resulting in lower reproduction and higher mortality rates. This in turn, Malthus argued, would cause the population growth to slow down, allowing the means of subsistence to catch up. Although the ability to expand food production is much greater than Malthus asserted, this does not mean that past populations never reached the upper ceiling of growth – that is, their carrying capacity. As an ecological concept, carrying capacity is defined as the population density that the resources of the habitat can support over time (Turchin and Nefedov 2009:6). This depends on social, cultural, economic and political factors as well as the constraints imposed by nature (Cohen 1995).

In societies with an agricultural system there is, at least theoretically, a considerable potential to increase growth and carrying capacity per unit area (Bocquet-Appel 2011:504). Increased production rates can lead to population increase, and this can force a systemic transition (or breakdown). The most prominent example from prehistory is the transition from foraging to farming during the Neolithic, *the Neolithic demographic transition*.[1] In short, this implies population growth due to increase in maternal fertility through reduced birth intervals determined by, amongst other things, energy balance and metabolic load (Bocquet-Appel 2011:1). This is also known from later periods in different parts of the world, leading Bocquet-Appel (2011) to term this the agricultural demographic transition. This allows us to hypothesize that shifts in farming regimes might cause significant population increase at different time stages in prehistory. Although it has been suggested that long-term population growth across continents was remarkably consistent through most of the Holocene (Zahid *et al.* 2016), several works have demonstrated a rapid increase in population on shorter time scales corresponding in time with the introduction of farming across different regions (Hinz *et al.* 2012; Bevan *et al.* 2017; Silva and Vander

Linden 2017). In Southeast Norway this is exemplified by a population increase in the Late Neolithic when an encompassing system of agro-pastoralism was introduced (Nielsen *et al.* 2019; Prescott 2020; Solheim 2021). We hypothesize that it is possible to identify such population shifts also in later periods when the agricultural systems were developed and became more technologically advanced and efficient, and expanded onto previously unused soils.

The local and regional physical environment influence human adaptations, including population patterns and forms of social organization (Orlove 2005). Geographically linked proxies of population dynamics and environmental productivity have demonstrated that phases of population growth and decline in hunter-gatherer societies were related to shifts in environmental productivity (Tallavaara and Jørgensen 2021). This is true also for agricultural societies where shifting weather regimes are known to affect crops and harvests, and cause population downturn (Bevan *et al.* 2017). Natural events such as volcanoes or cold events can also affect population pattern by impacting communities directly or indirectly by ecosystem bioturbation such as reduced growth capacity and changing growing conditions (Bondeson and Bondesson 2014; Büntgen *et al.* 2016; Fitzhugh *et al.* 2019; Riede 2019). Response to crisis is however determined by several factors such as the ecosystem's resilience as well as the cultural properties and the resilience of the humans in the ecosystem. Consequently, the impact of environmental change is conditioned by social factors.

Survey area

The research area is situated between 57.9° and 62.3° N. We have divided the area into two overreaching regions: 1) the inland, including the highland/mountain region and 2) the coast. The research area varies in topography and climate, offering contrasting living conditions and possibilities for resource exploitation. Most of the lower-lying parts of the inland consist of dense forests and bogs, while the elevated areas consist of alpine and sub-alpine regions. The most fertile areas of the region are situated along the Oslo fjord, and north of the fjord, including the areas around Lake Tyri and Lake Mjøsa. The reason for dividing the research area into 'coast' and 'inland' regions lies in their climatic and topographical differences.

The extensive outfield areas in the inland region, the forests, heaths and mountain areas, were clearly a resource through the Iron Age for pastures, hunting and trapping or iron production (Svensson 1998; Holm *et al.* 2005; Loftsgarden 2019). Nevertheless, sufficient arable land was still a premise for the farm. The first reliable census of 1769 shows that about the same number of people lived in the coastal region as in the inland region (Statistisk sentralbyrå 1980).

Data and methods

A new radiocarbon database for Southeast Norway is currently under development by the authors. This work is in progress and we aim to publish it, when completed, as an open and freely available database in the near future. In this paper, we activate parts of the collected data for the first time and we have included 7,168 radiocarbon dates from archaeological contexts in our analysis, dated between 4000 and 300 BP.

All radiocarbon dated samples are collected from excavated or surveyed archaeological sites in the eastern part of southern Norway (fig. 1). This includes various site types spanning from settlement areas to hunting sites, cultivation layers and iron production sites.

We have analyzed the radiocarbon data using the Summed Probability Distributions (SPD) analysis within the Rcarbon package (Crema and Bevan 2020) in the R statistical programming language (R Core Team, 2019) (fig. 2). Dates were calibrated using the Intcal20 calibration curve (Reimer *et al.* 2020). All dates are presented as calibrated dates BC/AD. Visual inspection of SPDs can lead to misinterpretations of booms and bust cycles as caused by population dynamics (Crema and Bevan 2020). To avoid this we follow the methods developed by Shennan *et al.* (2013) and Timpson *et al.* (2014) and later developments as described in Crema and Bevan (2020).

In order to mitigate bias of well-researched areas and well-dated sites we have structured the dates into bins with cut-off value at 50 years at site level prior to the SPD analysis. We then compare our dates with a theoretical null hypothesis of population growth fitted to the empirical data to avoid uncertainties related to the SPD. Here, we use an exponential growth model. Deviations from the null model indicate periods with population increase (in red) or decline (in blue).

To assess sub-regional and contextual variation in the dataset we perform a permutation test of SPDs from the inland and coastal regions as well as from different site and structure types. The permutation test generates simulation envelopes for each SPD by shuffling the dates belonging to different groups. A new SPD is made for each group and this is repeated 1000 times to generate a 95% confidence envelope based on the SPDs (Crema *et al.* 2016; Crema and Bevan 2020). Deviations from the null model indicate when the population increase or decline of the sub-region is greater than the pan-regional trend. This technique deals with issues resulting from the different sizes of the samples, as the produced confidence envelopes of regional trends are larger in those regions with fewer radiocarbon dates, reflecting greater uncertainty.

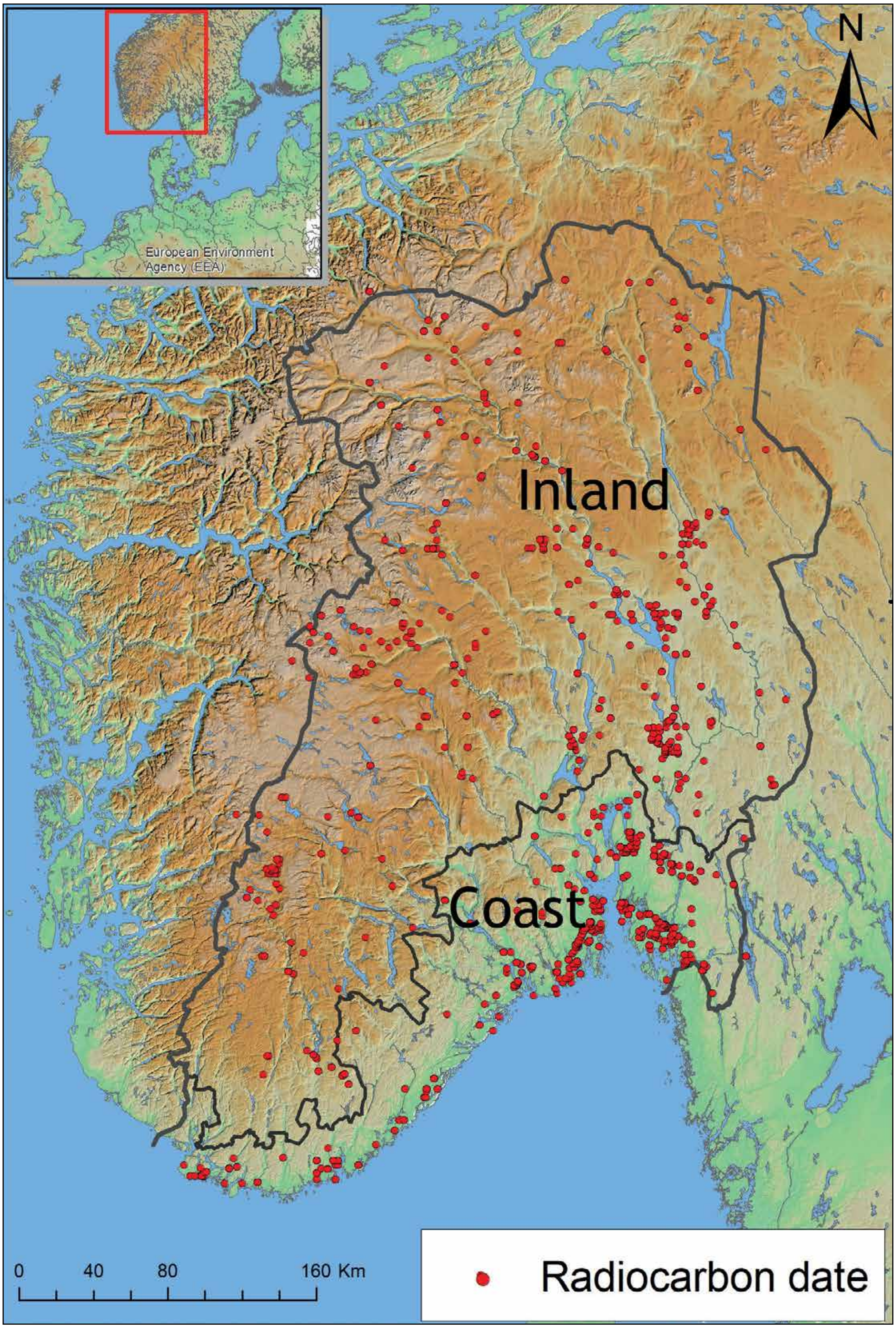


Figure 1. The research area of Southeast Norway, showing the distribution of radiocarbon dates and our delimitation between inland and coast. Illustration: Kjetil Loftsgarden and Steinar Solheim. Base map: GioLandPublic DEM from the European Environment Agency.

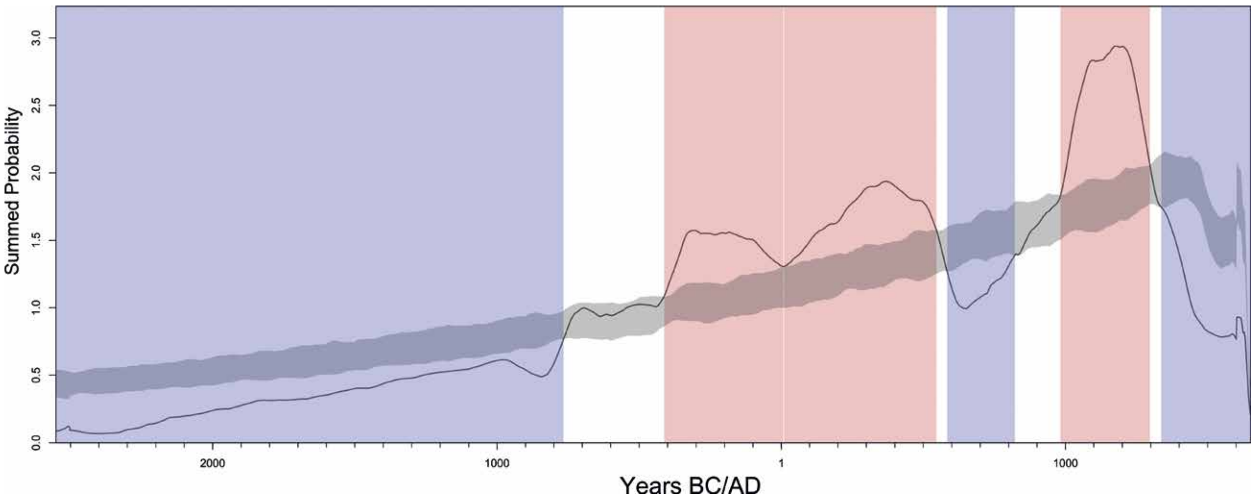


Figure 2. All dates. N=7,168. Analyzed using Rcarbon package (Crema and Bevan 2020) developed for R programming language (R Core Team 2019).

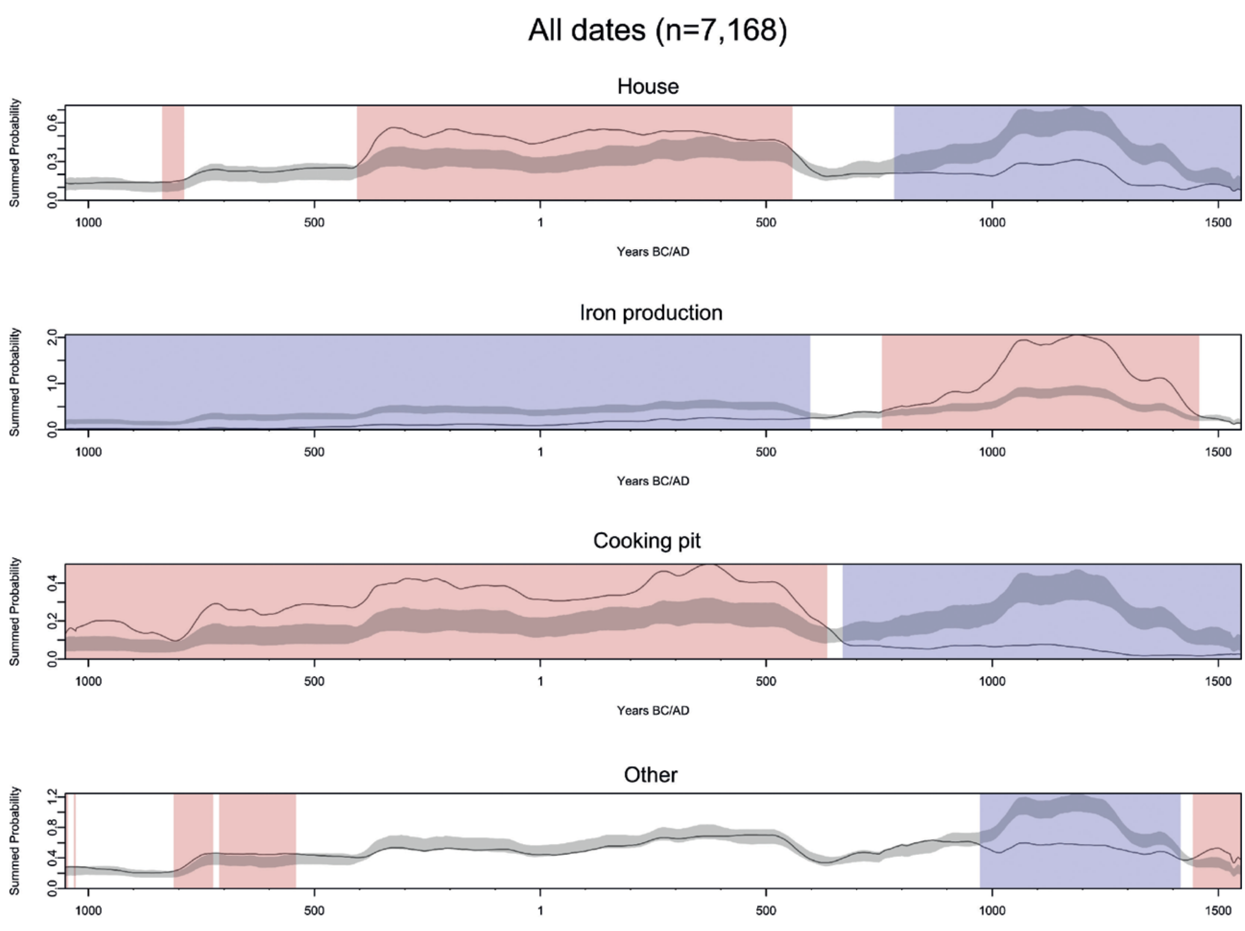


Figure 3. Permutation test of all dates from SE Norway. Analyzed using Rcarbon (Crema and Bevan 2020).

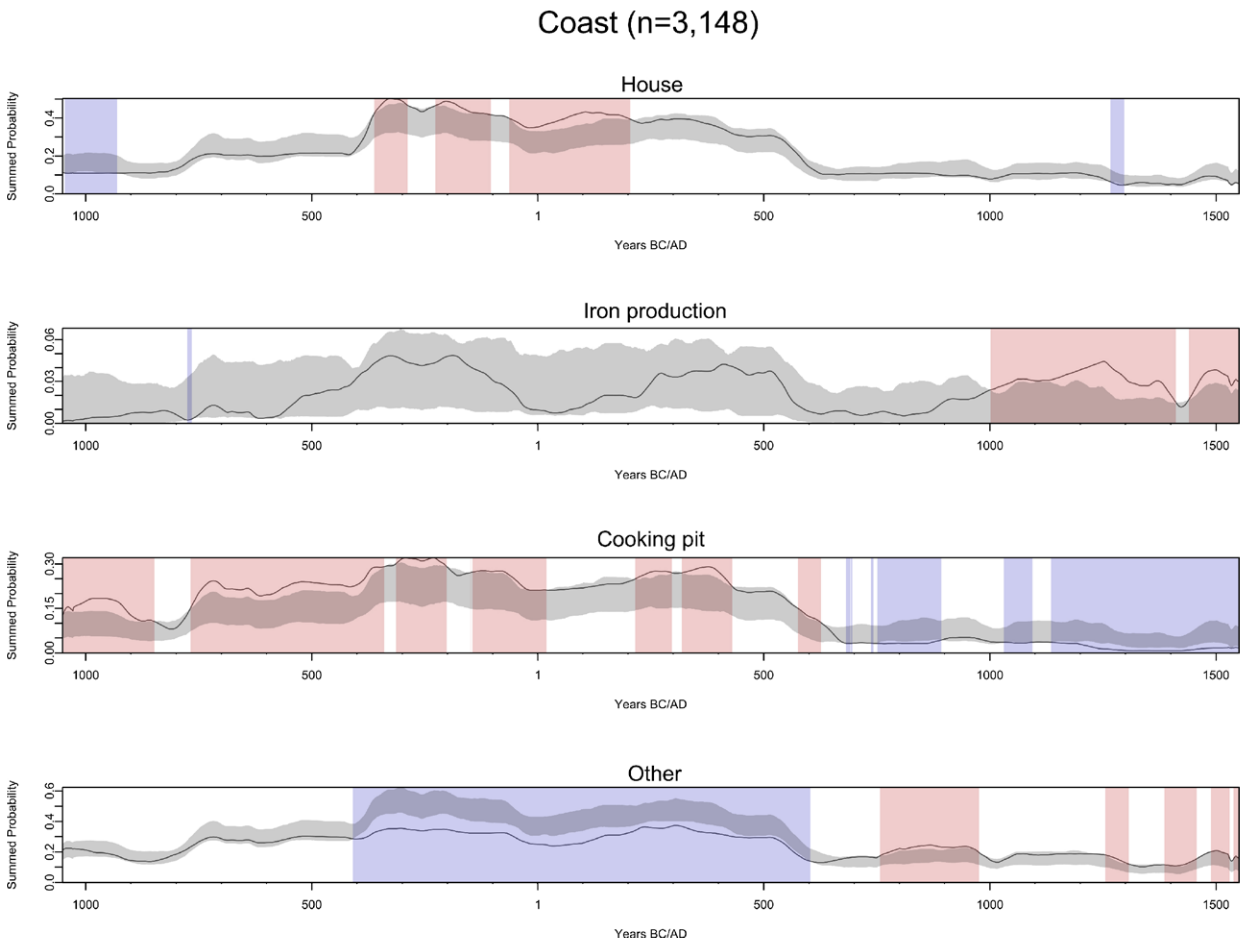


Figure 4a (above) and 4b (right). Permutation test of dates from the 'Inland' and 'Coast'. Analyzed using Rcarbon (Crema and Bevan 2020).

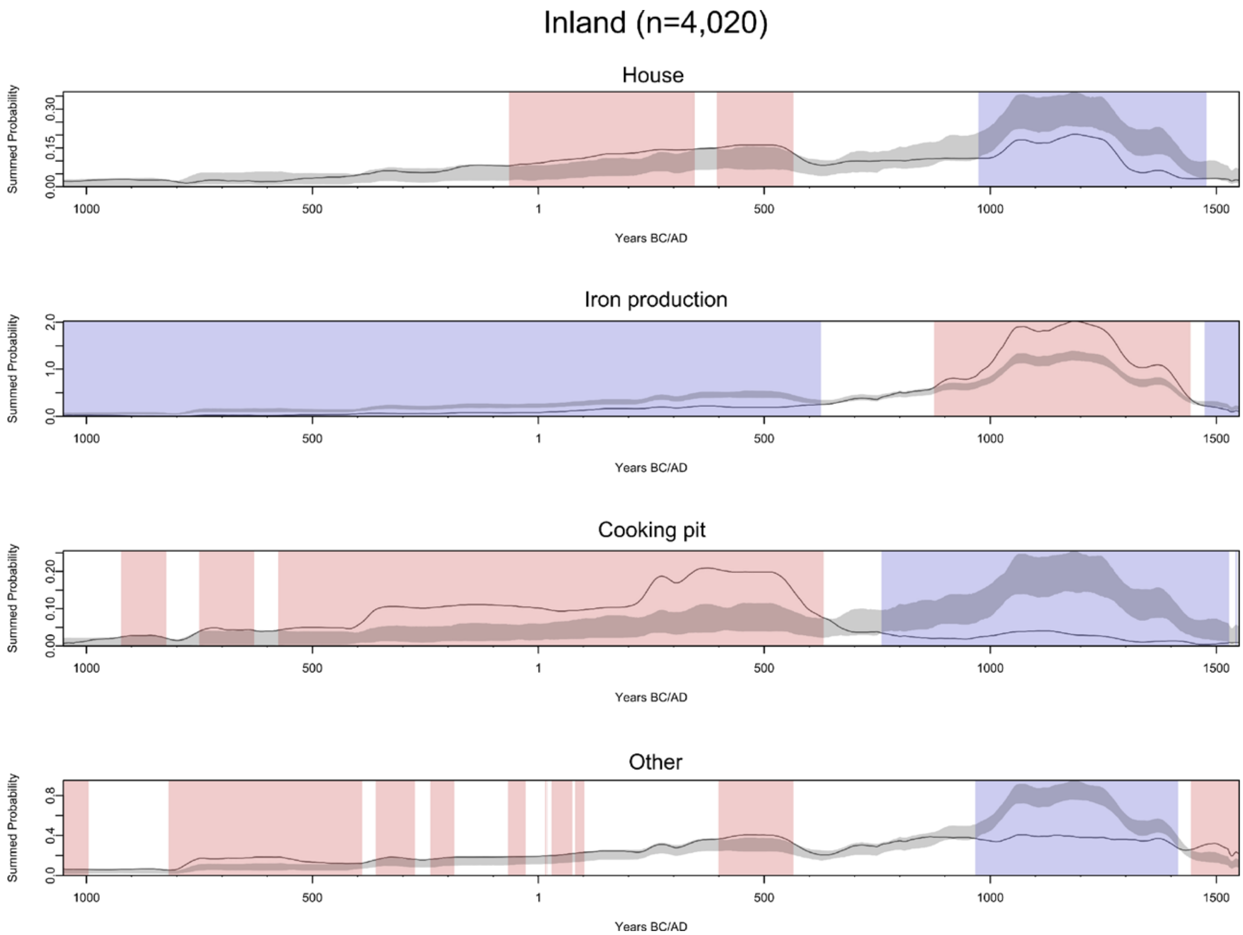
Results

The SPD displays a general population growth from the Late Neolithic, c. 2300 BC, throughout the Bronze and Iron Age and the first half of the Middle Ages, c. 1300 BC (fig. 3). There are several deviations from the pattern where the empirical curve rises and falls outside the confidence interval of the growth model. Although indicating a slow growth from c. 2400 BC it is not until 800–700 BC that the curve is within the range of the significance interval of the simulated growth model. At 400 BC there is positive local deviation lasting until AD 550, albeit with a decrease in population around AD 50.

Between 550 and 800 AD the curve drops outside the significance interval of the null model, showing a local negative deviation. Between 1000 and 1300 AD the curve rises and deviates from the growth model.

Although this is a large dataset, some sites or structures are more visible in the archaeological records and are subsequently disproportionately accentuated in the diagrams. An example being remains from iron production. From AD 600–700 to 1350 massive amounts of iron were produced almost exclusively in certain inland regions, engaging only a minor part of the population (Larsen 2009; Rundberget 2013; Loftsgarden 2020). Another type of structure that may skew the data is cooking pits. These are among the most easily recognizable archaeological structures when top soil stripping is carried out and are subsequently among the most dated structures, and they are especially numerous in the period AD 200–600 (Ødegaard 2019; Gundersen *et al.* 2020).

In order to bring to the fore any influence these structures might have on the SPD, we performed a permutation test (fig. 3), structuring the data as follows: 'House remains' (n=1,371) including postholes, hearths and wall ditches. 'Iron production' (n=2,157) including furnaces, slag heaps, roasting sites and charcoal pits. 'Cooking pits' (n=999) including, well, cooking pits. The category 'Other' (n=2,640) includes the rest of the radiocarbon dates from various sites and structures, such as graves, clearance cairns, cultivation layers and cultural layers.



The permutation test displays how the different categories deviate from trends in the SPD of the entire dataset. Some general similarities can be identified from these results, and 'House' and 'Cooking pit' show a positive deviation prior to c. AD 500–600. The category 'Other' remains within a statistical envelope except between 600 and 550 BC. 'Iron production' has a negative deviation from c. 1000 BC to AD 700–800 when it has a positive divergence from the envelope. All categories show either decline or relative stability at shorter or longer time intervals around AD 600 (fig. 3).

In order to reveal and analyze spatial trends and differences in the four main categories of archaeological feature we have performed a permutation test on the dates from the inland and the dates from the coast (fig. 4). With the exception of dates from iron production there is a decrease in the 6th century AD, across regions.

Discussion

A population increase occurred from c. 2350–2200 BC in Norway. This corresponds with the shift in food production from mainly foraging to a fully-fledged agropastoral economy (Prøsch-Danielsen *et al.* 2018; Nielsen *et al.* 2019; Prescott 2020), and possibly large-scale movement of people in northern Europe (Vander Linden 2016 for overview). During the Bronze Age crop cultivation was combined with livestock farming, and, in some areas, movement of livestock from the coast to inland pastures took place within a seasonal round (Prescott 2020). Mjærum has recently demonstrated that a process of increasing clearance of land for use as fields started from immediately after 1000 BC. This activity accelerated towards and into the early Iron Age when there was a large expansion of farming land onto stone-rich moraines with sandy ground, and when a mixed farming economy was fully developed (Mjærum 2020).

The development in farming goes hand in hand with an increasingly complex societal organization. During the Bronze Age southeastern Norway was part of a wide-ranging network stretching far outside today's Scandinavia (e.g., Melheim and Sand-Eriksen 2020). In the Late Bronze Age, after c. 1000 BC, these large-scale networks seem to break down across Europe. The breakdown of the Bronze Age system is partly explained by climate change but other processes were likely equally important, such as an increasing use of the more widely spread iron as raw material, which caused the exchange of bronze (tin and copper) to collapse (Solberg 2003:34; Armit *et al.* 2014). Except for a short decrease c. 950–750 BC, our data does not indicate any significant downturn in population during the Late Bronze Age, as seen in other regions (Armit *et al.* 2013). Generally, the population was low but steadily increasing before a more accelerated growth phase started between 800 and 700 BC, stabilizing the curve within the statistical interval of the null model until the transition to the early Iron Age.

The early Iron Age was a period of social and economic change. After the breakdown of the Bronze Age networks, new spheres of influence, often of regional or local character, emerged across Europe and in Norway (Kristiansen 1998; Solberg 2003). Bronze disappeared as status material and a gradually increasing local production of iron started. From around 200 BC and onwards iron production became increasingly prevalent in southeastern Norway and Scandinavia, benefiting the local population in ways bronze never could (Voss 1993; Stenvik 2003).

New data has shed light on the first part of the early Iron Age and, contradictory to prior knowledge, it seems that this was an expansive period where important socio-cultural development took place (Bukkemoen 2015; Gjerpe this volume). The number of three-aisled longhouses increased substantially, and it has recently been suggested that households in some regions organized themselves in villages, leading to increased social and economic security (Løken 1988; Gjerpe 2019; Haue this volume). At the same time, agriculture became technologically more advanced with the breakthrough of mixed farming (Mjærum 2020).

This expansion of arable land, development in agriculture and increase in settlements largely correspond with a population growth from c. 400 BC (fig. 2). Population dynamics can both cause and be the consequence of societal change. Although the results are unequivocal, several studies have shown that technological development, both in prehistory and in the modern world, occurs at times with population increase or a high population (Shennan and Sear 2021; Strassberg and Creanza 2021). Similar to what is documented across regions where the introduction of farming took place, the development in c. 400 BC in southeastern Norway might be a process where increased production rates caused by new farming technology and shifting crop regimes caused a population growth. New farming techniques involving fertilizing of fields probably led to an increase in energy yield, influencing population growth.

The 6th century crisis

The growth period lasted almost a millennium, but between AD 500 and 600 the population drops significantly. Most of the Migration period (c. AD 400–550) can be characterized as a time of expansion (Hedeager 2011); however, the last phase of the period sees unrest and turmoil in southern Scandinavia, and farms were being abandoned, both in central and marginal agricultural areas (Petersen 1933; Myhre 1972; Herschend 2009; Iversen 2013, 2016:42).

A similar development is observed at a regional level (Solheim and Iversen 2019), in line with an understanding of the 6th and 7th centuries AD as a time of great societal upheaval in Scandinavia. Major material and cultural changes are observable in a range of spheres such as graves, settlement patterns, language, ritual deposits, ornaments and food practices. The changes have long been recognized and explained by overpopulation, overexploitation of arable soil, social unrest or trade disruption (Gudesen 1980; Helgen 1982; Løken 1988; Myhre 2002). This area of research has recently gained increasing attention and it has been linked to sudden changes in climate and environment (Axboe 2001; Gräslund 2007; Herschend 2009; Zachrisson 2011; Gräslund and Price 2012; Löwenborg 2012; Price and Gräslund 2015; Gundersen 2019). The major cultural and material changes from the 5th to the 7th century show that this was an important transitional period in Scandinavia, and it has led researchers to suggest that following the crises of the mid-6th century AD, half of the population of Scandinavia perished (Gräslund and Price 2012:428–443). So far, this is mostly backed by regional studies; overall studies have been lacking.

Our data is a proxy for human activity and provides insight into the general trend in population dynamics in southeastern Norway that until now has been missing.

The 6th century AD is distinctly marked in the SPD, with a major and abrupt decline in population falling outside the confidence interval of the null model (see fig. 2 and 3). As we demonstrate in the permutation test, there are similarities in different categories in the inland and in the coast regions. In fact, there is a decrease within all major categories, except for contexts related to iron production as well as for the category “Other” in the coastal region (see fig. 2 and 4).

The SPD starts to decline c. AD 400. The decrease accelerates right after AD 500 and falls outside the confidence interval between 550 and 600, corresponding in time with two major crises in the AD 530–540s– a double volcanic eruption and an outbreak of the bubonic plague (Wagner *et al.* 2014; Büntgen *et al.* 2016). The two massive volcanic eruptions of AD 536 and 540 initiate a cooling period perhaps lasting for as long as into the mid-7th century (Sigl *et al.* 2015; Büntgen *et al.* 2016; Toohey *et al.* 2016). Around the same period, in AD 541, the first major outbreak of the bubonic plague is recorded in the Mediterranean (Little 2007). Signs of this pandemic have been identified as far north as the British Isles (Keller *et al.* 2019), but not yet in Scandinavia. It is possible that the plague also hit Scandinavia, and future aDNA studies might throw light on this (Price and Gräslund 2015:114–118; Iversen 2016:44–48).

An objection to several of the studies explaining systematic change following the mid-6th century events is that they demonstrate change at regional or local level, and that the material, cultural and societal transformations are never dated tightly enough to claim a causal connection to the precisely dated disasters the 6th century (Wickham 2005; Moreland 2018:96, 101; Gundersen 2019).

Our study is not regional and we provide data from an area larger than present-day Ireland or Switzerland, and with a population of 342.000 inhabitants in 1769 (Statistisk sentralbyrå 1980). Our substantial data offers a unique approach to studying the societal development of Iron Age Scandinavia. We agree with the challenges of correlating natural events at yearly or decadal scale with the archaeological material, but the methodological advancement seen in the treatment of aggregated radiocarbon data has taken us a step further in terms of temporal correlation of events and processes. This does not mean that climate change or disaster is necessarily the cause of the observed population decline. We do not adhere to "one-shot hypotheses" (Currie 2019) but in line with other possible explanations we here see climate change or disaster as contributory factors – possibly very significant ones – in a process, and a part of the explanation.

The agricultural decline around the middle of the 1st millennium AD is maintained in recent excavations in Norway, but may point to a gradual process originating before the 536/540-events (Gjerpe 2013; Gundersen 2016; see also Ystgaard *et al.* 2019:35–37). The decline is observed across regions, but researchers have also pointed towards regional differences in terms of how societies were impacted and how they reacted to the changes (Løken 1988; Myhre 2002:170–9).

Another approach to the 6th century changes focuses more on internal social and political factors to explain the decline in settlement sites and burials. As burial cairns and mounds are often interpreted as a way of establishing ownership to the farm, the lower number of known burials in the 7th and 8th centuries have been seen as indicative of increased tenant farming and not a decrease in the population numbers (Skre 1998; Myhre 2002:185–186). An additional explanation for the lack of archaeologically visible settlement sites from the 6th century and onwards is that the farms are located close to the historical settlements and there is a change in building style (Myhre 2002:170; Jessen and Stylegar 2012:133; Sauvage and Mokkelbost 2016; Eriksen 2015).

However, if we remove external factors, such as sudden climatic changes or pandemics, from the equation, we lack a satisfying explanation for why the decline happens at this time, across regions and including most types of sites. If the 6th century crisis was merely a re-organization of settlement patterns, we would expect it to be most pronounced in dates from settlement sites, especially house remains, while in fact the permutation test show that dates from houses/settlements stabilize inside the expected value of the growth model after AD 500. Still, the fact that we see the fall in activity across-the-board suggests that this was a shift in the fabric of society and a population decline.

Contrary to what is evident in most categories, iron production was not affected by the 6th century crisis, but was gradually increasing and continued to expand in the following centuries. This was also a transitional period in iron production, with a shift in technology towards smaller, less labour-intensive sites where iron production was increasingly located in the outfield areas of the inland (Stenvik 2003; Larsen 2009; Rundberget *et al.* 2013). We also see that a decrease in the category "House" is less pronounced in the inland (see fig. 4). At the same time, there is also an increase apparent regarding hunting and trapping (Pilø *et al.* 2018; Hennius 2020). We suggest that a reason for a less distinct population decline in the inland following the 6th century may be that the utilization of a wide-range of resources, such as husbandry and small-scale cereal cultivation, alongside a broad use of outfield resources, provided a flexibility and a resilience when facing sudden changes in climate and environment.

The Viking Age – High Middle Ages

The Viking Age up until the High Middle Ages (c. AD 800–1350) was a period of expansion – the Viking diaspora, increasing trade, production, and the establishment of Scandinavian towns. In Scandinavia, as well as in Europe as a whole, there was a boom in population and settlements at the end of the first millennium AD, likely linked to a stable warm climate (McEvedy and Jones 1978; Benedictow 1996; Barrett 2008; Büntgen *et al.* 2016). The population increase is continuing in the Middle Ages, where the number of farms in Norway are estimated to have increased from c. 27.000–30.000 farms at AD 1000 to c. 60.000–70.000 at AD 1300 (Olsen 1939; Sandnes and Salvesen 1978:58; Benedictow 1996; Lunden 2002:20; Solberg 2003:241).

Our data, on the other hand, does not clearly reflect the population increase outlined above. There are several reasons for this, most notably the previously mentioned change in settlement structure from the 6th century and onwards (Myhre 2002:170; Jessen and Stylegar 2012:133; Sauvage and Mokkelbost 2016; Eriksen 2015). Both the change in the location of the farm closer to the historical settlements, as well as the change in building style, means that almost 90 percent of the excavated settlement sites in Norway are from the periods prior to the Viking and Middle Ages (Gjerpe 2016:41). Add to this that cooking pits mostly go out of use in the Viking Age, and we might have an explanation why there is a decline in the radiocarbon data from the Viking Age. Due to the plateaus in the calibration curve researchers have also tended to avoid using radiocarbon dates compared to typology or dendrochronology to date sites from the Viking Age. As such, it is difficult to use the radiocarbon data to show the demographic development of Norway in The Viking Age and Middle Ages.

Conclusion

By analyzing 7,168 dates from southeastern Norway in a SPD, we have directed focus towards two important population events. The first is a long-lasting growth phase, beginning in the 5th century BC and lasting until the 5th and 6th century AD, most likely initiated by technological improvement in agricultural techniques and clearance of new land. The second event we have pointed out based on our data, and as demonstrated in fig. 2, is the abrupt decline in the 5th and 6th centuries.

The 6th century crisis has garnered a lot of attention in recent research. While we recognize that there were local and regional differences in responses to the processes taking place, our data allows us to identify overall patterns, across regions and types of archaeological features and sites. We have identified an inter-regional decrease in the radiocarbon data in the mid-6th century (see fig. 4). The fall in radiocarbon dates indicates a decline in human activity, at least across two large regions.

Here we have deployed, for the first time, a newly generated radiocarbon database from southeastern Norway. As we have shown, the strength in using aggregated archaeological data, such as radiocarbon dates, and applying new methods to analyze such data, is the ability to look past individual cases, expose general patterns, and provide insight that is difficult to attain at site scale.

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Notes

[1] Even more pronounced is the demographic change and population growth following the industrial revolution during the 19th century.

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Plant remains as sources to cultural history in Southeast Norway

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Abstract

Plant remains are valuable sources for cultural history. Humans and animals live inextricably together with plants. This article investigates how a large dataset of botanical macrofossils can give insights into cultural history in southeastern Norway in the period 400 BC– AD 400. In this period, iron was introduced in the production of weapons and tools, which led people to change practices in their interaction with nature. Farming is dependent on a great variety of environmental resources for cultivation and the gathering of food, medicine, and fodder. By combining archaeological and botanical data from 40 localities from Viken and Innlandet counties this article investigates the macrofossil diversity within the localities, as well as the regions they belong to. All archaeobotanical finds from the localities have been systematized and analyzed quantitatively. The results reveal patterns in regional biodiversity as well as a representation of species in structures and features in archaeological sites.

Keywords: Archaeobotany, plant history, plant utilization, South-eastern Norway, regional variances

Introduction

Plants are and have always been essential for human life and activities; this is as true for cereals and timber as well as other plants used as food, medicine, or material culture. Archaeobotanical remains from archaeological excavations serve as important sources for interpreting past practices in farming, foraging, food, fodder, medicine, and rituals (Day 2013; Jacomet 2013; van der Veen 2018). Such “ecofacts” may provide a bridge to past concepts of nature and human-nature relations (Richer and Gearey 2018) because they are actual remains of, and sources to the study of, landscape and vegetation and therewith provide concrete insights about the environment that people perceived. This article explores how plant remains sampled from 40 localities in Innlandet and Viken counties in southwestern Norway can yield nuanced information on how people interacted with plants in the period 400 BC– AD 400.[1]

Large-scale analyses of archaeobotanical remains may contribute to an awareness about typological patterns in the representation of macrofossils from archaeological excavations and hence be helpful for future analyses of more detailed plant utilization. Combined results from all sites are expected to display great variance when it comes to the representation of species, the actual number of macrofossils and their archaeological relation. In this article,

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we investigate the following three areas: 1) if there are observable patterns in the distribution of archaeobotanical remains within site types, structures, and features from the selected area and time period, 2) the species richness within the localities, and 3) whether historical regional variance in macrofossil diversity in Innlandet and Viken may be revealed through big data analyses.

The results from these investigations serve as a foundation for discussing how archaeobotanical results may be used for exploring further cultural historical activity in the localities. Through these investigations, we also identify some ever-present challenges in the sampling strategies and pinpoint information could provide more detailed insights into past human-plant interference.[2]

Background

Much of the historical interest in studying people's interference with plants centers around the domestication and cultivation of land, especially in the Iron Age, since this period is characterized by important innovations in farming and cultivation (Solberg 2003 [2000]; Myhre 2002; Welinder *et al.* 2004). The interest in studying technological inventions and abilities of crop domestication can be said to be founded on an economic view of nature – nature being a supply of resources – going back to the 17th century (Hverven 2018). People's understanding of the concept of nature has undergone drastic changes throughout history in close relation to changes in ideological and religious convictions (Taylor 2020). People relate to nature, and they do this with both conscious and subconscious intentions and motivations. In a semiotic mindset (Lotman 2008 [1996]), ecofacts and human messages of various kinds are all important jigsaw puzzle pieces in the bigger picture of past societal organization, cultural encounters, technological development, cognitive status, climatic changes, and environmental impact. For example, Norwegian toponyms preserve insights regarding how places have been used or how the surrounding landscape has been perceived.

In Norway, pollen analyses (microfossils) have been widely integrated as sources to vegetation history (Fægri 1944; Hjelle 2005; Høeg *et al.* 2019), whereas macrofossils are traditionally less used in analyses of historical perspectives on human-environmental interactions. Pollen diagrams can illustrate changes in species composition and communicate how plants and forests have formed the landscape from before the period of ice melting up to today through processes such as deforestation, ground clearing, and climate change, as well as other landscape changes caused by human activity, such as fodder harvesting and pasturing (Høeg 1996:11–14). The different plant species' pollination strategies influence the abundance of pollen in a site, which biases the understanding of the cultural implications in the landscape. Moreover, the diagrams often focus on the plants as indicators of various anthropogenic activities in the landscape and do not necessarily consider the implicit value of the plant and therewith their cultural uses (Richer and Gearey 2017). The taxonomic resolution is typically lower for pollen identification than for macrofossils, which makes it easier to link pollen to a plant family, whereas the seeds often provide more information for determining the plant species.

Archaeobotanical sampling (macrobotanicals) has been integrated into regular excavation practice in Norway since the 1980s (Hjelle *et al.* 2017 with references). Macrobotanicals enable studies of the activity within a location since soil samples can be compared from different activity areas within a site. Suitable methods for interpreting such data have been outlined focusing specifically on cereals and grain cultivation (Grabowski 2014). The amount, quantity, and analytical treatment of excavated soil-samples vary from site to site. Possible use areas connected to corresponding plants are occasionally suggested in the archaeological reports, often with reference to more recent knowledge of plant traditions (e.g., Høeg 1996:151–153).

There are many unknown facets of people's interaction with plants in the Iron Age. Increased population growth of both people and their domestic animals in the Iron Age required more food and fodder (Myhre 2002; see also Gjerpe this volume; Loftsgarden and Solheim this volume). As in more recent times, many of the harvested plants were probably gathered in the outfields (Teixidor-Toneu *et al.* 2020) and represented a significant contribution to past farming societies (e.g., Bharucha and Pretty 2010; Turner *et al.* 2011). Since broad data sampling is usually the standard in all excavations, plant history can be extracted from these excavations, even without being the initial aim and purpose of the excavation.

Materials and methods

The dataset for this study consists of reported finds of macrofossils from excavations performed in southeastern Norway in the period 1993–2018 by the Museum of Cultural History, University of Oslo (KHM).[3] The archaeological period ranges from 400 BC– AD 400 and includes macrofossils collected from 40 localities in the former counties of Østfold and Akershus (since 2020, part of the new county Viken), Hedmark and Oppland (since 2020, united in the new county Innlandet).[4] Innlandet is represented by 14 localities with 18 farm numbers. Viken is represented by 26 localities with 30 farm numbers. Larger excavations sometimes contain more than one locality (with multiple farm numbers). These are here combined.

The macrofossil samples were analyzed by external laboratories post-excavation. The laboratories are based in Nordic countries such as Norway, Sweden, and Denmark. In the current dataset, macrofossil data is compiled from the lab reports themselves or excerpts from these reports (which are presented in archaeological reports).

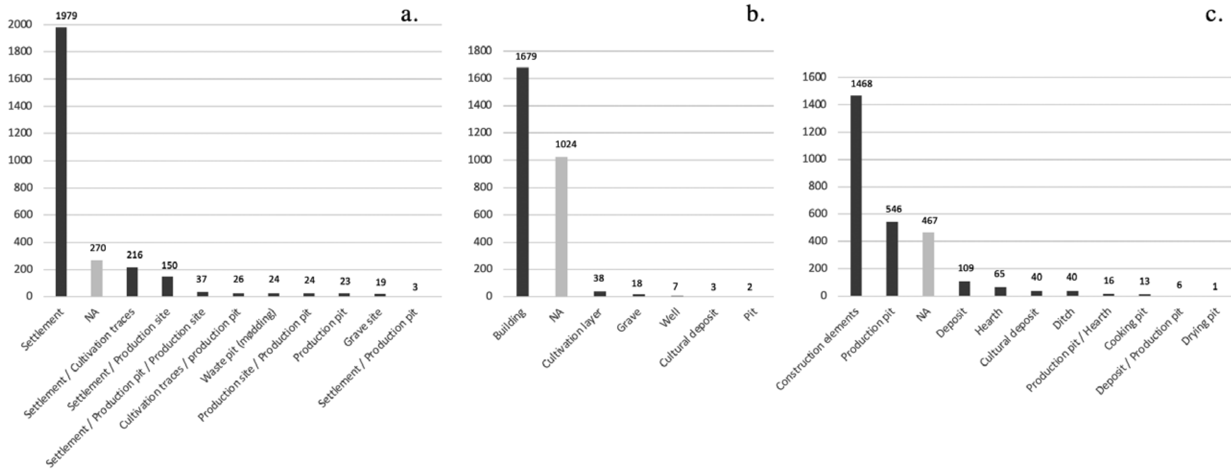

Figure 1. Number of reported archaeobotanical finds per site type (a), structure (b) and feature type (c). NA means "Not Available".

For this study, we included all macrobotanicals that we could access information on, both dated and undated (primary sources for dataset is listed in the bibliography). Microfossils (pollen) are not included. The majority of macrofossils sampled by KHM today are not dated, but context material from the same feature is often dated and is often used as a period indicator for the macrofossils. Charred material, dominated by cereals and charcoal, is often prioritized for analyses. Charcoal and wooden remains are particularly valuable since they provide an opportunity to put a date on the use and place in question (ongoing ^{14}C-database construction at KHM[5]). Among seeds, cereals are considered valuable since they are larger and thus provide more material for dating analyses compared to smaller wild seeds, but also because cereals indicate cultivation and domestication of land (Hjelle *et al.* 2017:303). Few uncharred seeds and plant remains are likely to be old, unless there are particular preservation conditions (waterlogging or mineralization) in the excavation area (Sture 2016 with references). Wild herbs have very few dated representatives. Consequently, the dataset consists of a majority of undated macrobotanicals, relying on the dating of context material. By presenting the data side by side, the possibilities and the challenges in the material can be addressed independent of dating.

For the investigation of observable patterns in the distribution of archaeobotanical remains (the first of the areas of investigation listed in the Introduction to this paper 1), the data is organized through a set of parameters. The two counties of Viken and Innlandet, containing 25 municipalities, were chosen because they are known to contain localities with large macrofossil quantities. A locality contains one or more site type (e.g., settlements, production sites). Within a site type there are one or more structures, such as houses, graves etc., whereas features in a site type are typically postholes, forges, cooking pits etc. Sometimes processed plant materials are found within features. These objects, such as wooden plugs, textile cloths etc., may be species determined, or dated. The macrobotanicals are sometimes recognized as plant parts such as seeds, bark, charcoal, nuts, or fruit which may or may not be botanically identified at a species level. The preservation status may be charred, dried, waterlogged, or mineralized – however this is not always stated in analysis reports.

The site types were classified into ten categories, structures were grouped into six categories and features were grouped into ten (fig. 1). Plant taxa appearances in specific site types, structures, and features were explored using a generalized mixed-effect regression model (family binomial) with locality (i.e. excavation site) as a random effect. This model allows analyzing non-normal data such as counts and percentages when random effects are present. Here, random effects are used to avoid pseudo-replication (i.e. repeated measures from the same location; Bolker *et al.* 2009).

For the investigation of the distribution of species richness within the localities (the second of the areas of investigation listed in the Introduction to this paper), macrobotanicals have been systematized in groups of tree, cereal and herbs, and macrofossil data was systematized in spreadsheets for the two counties (tab. 1 and 2). The column *Total taxa no.* refers to the total number of species (taxa diversity) found at a given site and is represented by macrofossils such as charcoal, seeds, bark, buds, stems, nuts, cone scale, and leaves. *No. of tree taxa* represents the total number of tree taxa represented by nuts, charcoal, leaves, or bark. *No. of herb taxa* represents herbaceous plant taxa determined from seeds. Herbaceous plants do not have woody stems and many of them may be regarded

Locality	Farm nr.	Site type	Total no. of taxa	No. of tree taxa	No. of cereal taxa	No. of herb taxa	Total no. of macrofossils	Qu. of tree macrofossils (of which fruit/ leaf/bark)	Qu. of cereal macrofossils	Qu. of herb macrofossils	Taxa of highest abundance in a feature/ Taxa of second highest abundance in a feature	Quantity (dated)	Structure	Feature
Leikvang	14/2	settlement	21	10	2	9	599	555**	9	35	Galium spurium	8 (365-425 AD)	longhouse	posthole
											Hordeum vulgare	4 (35-30 AD)	longhouse	posthole
Ljøstad	296/1, 2	settlement	18	7	4	7	340	298** (1)	34**	8**	Cerealia	2 (45-250 AD)	house area	posthole
											Brassica sp.	1 (215-420 AD)	house area	posthole
Vevla	26/1	settlement	13	8	1	4	242	232** (1)	5	5	Persicaria lapathifolia	2	longhouse	posthole
											Cerealia	1 (0-85 AD)	longhouse	posthole
Vold	6/1	settlement	21	11	3	7	1296	1278** (59)	4	14	Chenopodium album	2	cultivation layer	layer 3
											Galium aparine	7	cultivation layer	layer 3
Åker	7/201	settlement	50	8	3	39	4533	141 (42)	2787	1605	Stellaria media	197	house area	posthole
											Stellaria media	192	house area	posthole
Berg	138/1, 4	settlement/	9	4	2	3	56	39**	5	12	Spergula arvensis	9	house area	posthole
		cultivation traces									Hordeum vulgare*	1 (250-375 AD)	house area	posthole
Fulu store	3/8, 10	settlement	18	12	5	1	329	297** (4)	30**	2	Hordeum vulgare var. Nudum	19 (405-375 BC)	-	burial / drying pit
											Triticum turgidum subsp.	3	-	burial / drying pit
Melstrøm	18/9	settlement	10	7	3	0	44	39** (1)	5	0	Cerealia	3	-	burial
											Secale cereale	1	-	burial
Nyhuset	94/3060	settlement	13	4	3	6	604	272	224	108	Avena sativa	70	-	bloomery furnace
Haukstad											Stellaria media	39	-	bloomery furnace
Valum gård	20/1	settlement	38	4	5	29	2473	12**	889	1572	Chenopodium album	568	longhouse	posthole
											Hordeum vulgare var. vulgare	388	house	-
Trogstad	16/1, 17/1	settlement/	22	15	3	4	271	249** (2)	19	3	Cerealia	9	house	forge/smithy
		cultivation layer									Hordeum vulgare	2 (680-890 AD)	house	posthole
Børstad	4/1	cooking pit locality/	11	8	2	1	222	207**	4	11**	Linum usititassimum	10 (350-110 BC)	-	forge
		production site (iron)									Avena sativa	2	-	forge
Hveem	72/1	settlement/	15	4	2	9	108	87	9	12	Hordeum vulgare	6 (200-125 BC)	-	cultivation layer
		cultivation traces									Persicaria sp.	1 (15-90 AD)	-	posthole
Dæhlen	66/6	settlement/	29	2	4	23	1272	355 (4)	420	497	Chenopodium album	146 (180-60 BC)	house area	posthole
		cultivation traces									Cerealia	192	house area	posthole
Sum							12389	4061	4444	3865				

Table 1. Table presenting the excavated locations from Innlandet and the reported macrofossils from each locality organized in columns presenting the total number of taxa, divided in the number of tree taxa, cereal taxa and herb taxa from each site, as well as the total number of macrofossils and how they are distributed between trees, cereal and herbs.
** value is set to 1 where quantity was not given. Fragments are counted as 1 seed. *when more than one species have the same highest quantity in a locality the example is chosen at random. Quantity is given along with available dating results. If context material has been dated (material found together with macrofossil in the same feature), this is indicated in italics. Note that "seeds of *Hordeum vulgare*" in Valum gård was given for the whole structure and not per feature.

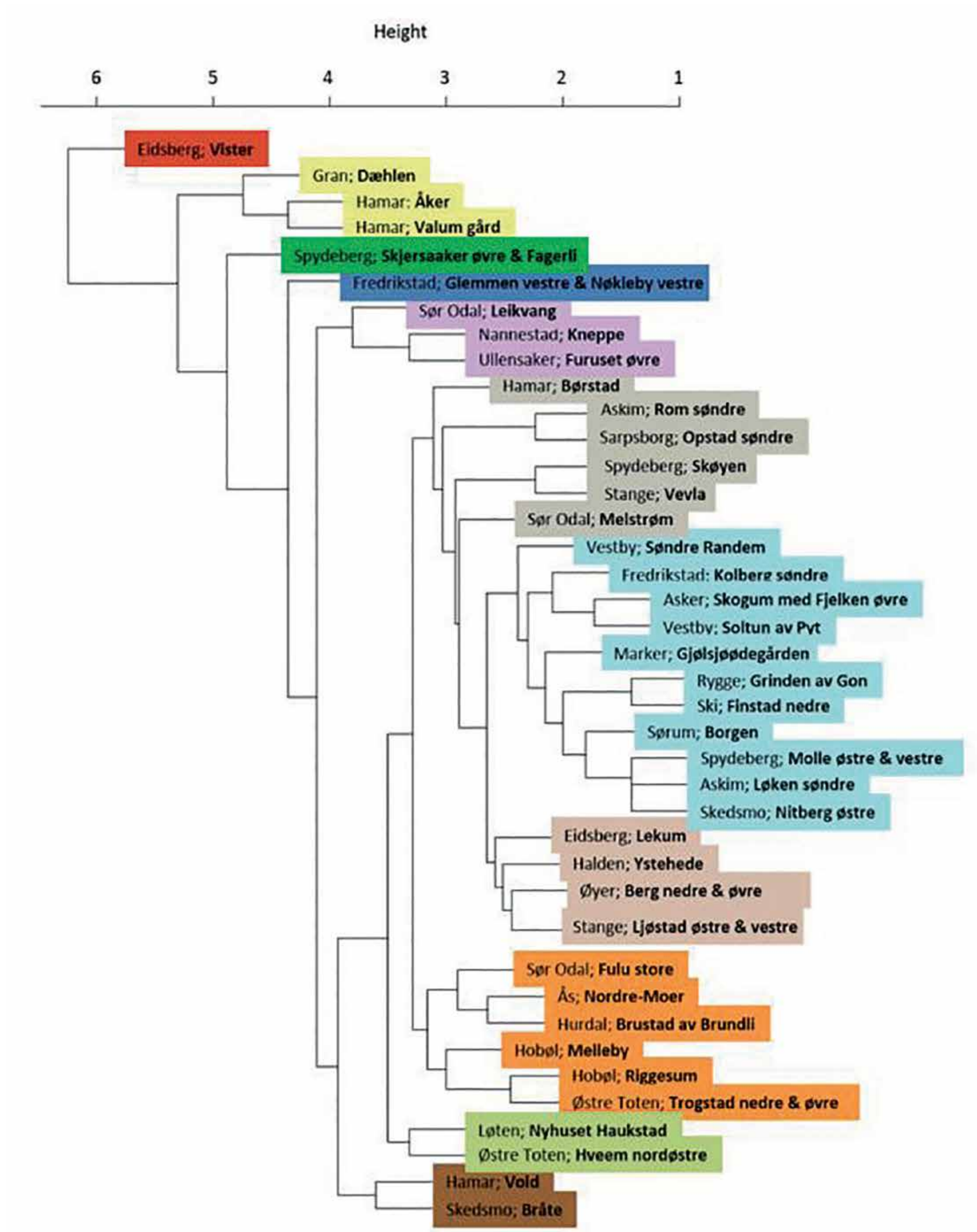

Figure 2. A dendrogram showing clusters of excavated localities based on similarities of species presence/absence.

Locality	Farm nr.	Site type	Total no. of taxa	No. of tree taxa	No. of cereal taxa	No. of herb taxa	Total no. of macrofossils	Qu. of tree macrofossils (of which fruit/ leaf/bark)	Qu. of cereal macrofossils	Qu. of herb macrofossils	Taxa of highest abundance in a feature/ Taxa of second highest abundance in a feature	Quantity (dated)	Structure	Feature
Borgen	30/1	settlement	6	5	1	0	650	646	4	0	Cerealia	2 (260-450 AD)	longhouse	posthole
											Cerealia	1 (350-530 AD)	longhouse	posthole
Brustad	19/1	settlement / cooking pits	16	8	3	5	375	365 (1)	4	6	Papaver sp.*	1	longhouse	posthole
		production site (iron)									Corylus avellana	1 (130-230 AD)	longhouse	posthole
Bråte	78/11	settlement	26	10	4	12	853	816	9	28	Cerealia	4 (330-540 AD)	house	posthole
											Persicaria lapathifolia*	3 (260-540 AD)	house	posthole
Finstad nedre	137/1	settlement	9	7	1	1	448	445**	2	1	Cerealia	2 (425-540 AD)	two aisled house	posthole
											Galium aparine	1	two aisled house	posthole
Furuset øvre	110/1	settlement /	25	6	3	17	263	25 (11)	4	234	Stellaria media	28	wind break	posthole
		production site									Corylus avellana	1 (120-230 AD)	-	burial
Kneppe	36/120	settlement	20	6	1	13	131	91 (10)	1	39	Chenopodium album	5	house	posthole
											Chenopodium album	4	longhouse	posthole
Nitberg østre	33/31	settlement	5	5	0	0	215	215	0	0	Picea abies - needle leaf	44	smithy	pit
											Picea abies - needle leaf	41	smithy	pit
Nordre Moer	54/3	settlement	15	9	4	2	1889	1870 (2)	15**	4	Cerealia	3 (95-30 BC)	four post consr.	posthole
											Euphorbia helioscopia	2	four post consr.	posthole
Skogum / Fjelkem	21/1	settlement	6	5	1	0	241	240	1	0	Hordeum vulgare	1	-	cooking pit
Soltun av Pyt	39/42	settlement /prod. site	7	6	1	1	323	319	2	2	Hordeum vulgare	2	-	cultural deposit
Søndre Randem	8/3	settlement	10	6	3	1	313	309	3**	1**	Triticum aestivum	1	house	posthole
											Cerealia	1	house	posthole
Gjølsjøødegården	97/7	settlement	10	3	5	2	49	28	13	8	Galium sp.	5	longhouse	posthole
											Hordeum vulgare var. nudum	4	longhouse	posthole
Glemmen / Nøkleby	202/11,	settlement	24	7	3	14	1810	864 (3)	918	28**	Cerealia	143	house	wall ditch
	203/120										Cerealia	256	house	posthole
Grinden av Gon	9/2	settlement	7	6	1	0	572	571	1	0	Cerealia	1 (400-360 BC)	house with paddock	posthole
Kolberg søndre	28/6	settlement	10	9	1	0	744	742	2	0	Hordeum vulgare	1	-	cooking pit
											Hordeum vulgare	1	-	hearth
Lekum	90/1	grave field	8	7	1	0	17	16**	1	0	Hordeum vulgare var. nudum	1 (205 BC-5 AD)	-	grave
Løken søndre	54/8	settlement	5	4	1	0	217	216	1	0	Hordeum vulgare	1 (360-100 BC)	-	burial
Melleby	45/1	settlement	17	10	2	5	196	187	4	5	Persicaria maculosa*	1	longhouse	postpipe
											Carex nigra*	1 (377-197 BC)	longhouse	postpipe
Riggesum	51/1	settlement	14	11	2	1	312	307	4	1	Hordeum vulgare var. nudum	1 (362-178 BC)	two aisled house	posthole
											Spergula arvensis*	1 (1657-1950 AD)	longhouse	posthole

Locality	Farm nr.	Site type	Total no. of taxa	No. of tree taxa	No. of cereal taxa	No. of herb taxa	Total no. of macrofossils	Qu. of tree macrofossils (of which fruit/ leaf/bark)	Qu. of cereal macrofossils	Qu. of herb macrofossils	Taxa of highest abundance in a feature/ Taxa of second highest abundance in a feature	Quantity (dated)	Structure	Feature
Molle østre & vestre	2/1, 2/2	settlement	14	6	1	7	797	781 (7.)	2	14	Spergula arvensis*	2	smithy	ditch
											Stellaria media*	2	smithy	post
Opstad søndre	2073/7,	settlement	5	1	4	0	1211	3 (3)	1208	0	Hordeum vulgare	371 (470-395 BC)	longhouse	posthole
	146										Triticum aestivum	4 (395-370 BC)	longhouse	posthole
Rom søndre	91/2	settlement	8	2	3	6	240	2**	234**	4	Hordeum vulgare	100	-	posthole
											Cerealia	100	-	posthole
Skjersaaker / Fagerli	40/7	settlement	38	11	2	25	485	317	4	164	Chenopodium album	9	longhouse	-
											Stellaria media	9	longhouse	-
Skøyen	5/1	settlement	18	7	3	8	867	538 (31)	308	21	Cerealia	73	house	post
											Hordeum vulgare	25	longhouse	post
Vister	185/2,	settlement	49	6	3	40	1228	494 (1)	465	269	Cerealia	116	house	posthole
	185/7										Hordeum vulgare	112	house	posthole
Ystehede	196/17	settlement	3	2	0	1	11	4** (3)	0	7	Rubus saxatilis	3	two aisled house	posthole
											Rubus saxatilis	2	two aisled house	posthole
Sum							14457	9913	2745	560				

Table 2. Table presenting the excavated locations from Viken and the reported macrofossils from each locality organized in columns presenting the total number of taxa, divided in the number of tree taxa, cereal taxa and herb taxa from each site, as well as the total number of macrofossils and how they are distributed between trees, cereal and herbs.
** value is set to 1 where quantity was not given. Fragments are counted as 1 seed. *when more than one species have the same highest quantity in a locality the example is chosen at random. Quantity is given along with available dating results. If context material has been dated (material found together with macrofossil in the same feature), this is indicated in italics.

as useful plants and edible crops. *No. of cereal taxa* sums up all identified grains that are cultivated by humans. Note that a plant part was counted as a single taxon if it is identified at family, genus, or species levels (e.g., Salicaceae and *Populus tremula* count as 1 taxon each dependent on identification level). The total quantity of macrofossil samples in a locality is given in the column *Total no. of macrofossils* and divided into three columns: *Qu. of tree macrofossils* (of which x is fruit/leaf/bark), *Qu. of cereal macrofossils* and *Qu. of herb macrofossils*. The *Taxa with the highest / second highest abundance in a feature* are identified for all the localities in Innlandet and Viken (tab. 1 and 2, respectively), and enabled comparisons between the highest quantity of macrobotanicals in the various locations.

To evaluate regional variability of macrofossil diversity between sites (the third of the areas of investigation listed in the Introduction to this paper) we used a cluster analysis based on Euclidian distances using the functions *dist* and *hclust* (method "average") from the R stats library (Venables and Ripley 2002; Oksanen *et al.* 2008) that results in a dendrogram grouping excavation site based on macrofossil similarities (fig. 2). Sites were compared based on presence or absence of the taxa included in the dataset. The resulting groupings were color-coded and organized in a map (fig. 3). Excavation sites in the map were color-coded based on the groupings resulting from the cluster analysis. GPS coordinates for each excavation site were taken from norgeskart.no, as coordinates given in archaeological reports sometimes vary. The position of a locality was found by searching the farm number and municipality. Maps were made using QGIS3.14.16.[6]

Results

Investigations confirm that there are observable patterns in the distribution of archaeobotanical remains within site types, structures, and features from this time period and area (fig. 1). *Site types*: the majority of archaeobotanical remains in the excavations from 400 BC to AD 400 are from settlements (71%), settlements/cultivation traces (8%) and settlement/production sites (5%). *Structures*: most archaeobotanical remains are preserved from buildings (61%); over a third of the structures are not determined. *Features*: the archaeobotany distribution over features are somewhat more varied. About half of the archaeobotanical remains (53%) are found in construction elements (such as postholes, wall ditches), one-fifth (20%) in production pits (such as cooking pits, forges), and nearly 5% in deposits.

The final dataset consists of 40 localities with a total number of 25,607 macrofossil samples. Of these, 13,974 (55%) samples are tree macrofossils (charcoal, nuts, leaves etc.), 7,189 (28%) are cereal macrofossils (cultivated grains), and 4,444 (17%) are herb macrofossils (wild or cultivated herbaceous plants such as flax, goosefoots, grasses, raspberry etc.). For Viken, the data (13,218 samples) consists of macrofossils from trees 9913 (75%), cereals 2,745 (21%), and herbs 560 (4%). The data from Innlandet (12,389 samples) consists of macrofossils from trees 4,061 (33%), cereals 4,444 (36%), and herbs 3,884 (31%). In general, these results confirm that Innlandet county has a balanced ratio between total no. of herb/tree/cereal. Viken has very little herb material represented (4%). Only sites with very few taxa (n = 3–5) lack cereals, and this is the case for two localities (Nitberg Østre and Ystehede).

The most species-rich locality in Innlandet is Åker with 50 represented taxa and in total 4,533 macrofossil samples (141 tree samples, 2,787 cereal entries, 1,605 herb samples). The least species-rich locality in Innlandet is Berg Nedre and Øvre with nine taxa and 56 macrofossil samples. In Viken, the most species-rich locality is Skjersaaker Øvre / Fagerli with 38 represented taxa and 485 macrofossil samples. The most species-sparse locality in Viken is Ystehede with only three taxa and 11 macrofossil samples.

In Innlandet, some kinds of cereals are represented with the highest abundance (at 6 out of 14 localities) and the second-highest abundance (9 out of 14 localities). Herbaceous plants are represented with the highest abundance (eight out of 14 localities) and the second-highest abundance (5 out of 14 localities). In Viken, cereals are represented with the highest abundance (16 out of 26 localities), and the second-highest abundance (8 out of 21 localities). Herbaceous plants are represented with the highest abundance (8 out of 26 localities) and the second-highest abundance (9 out of 21 localities).

The macrobotanicals found in the largest quantities per samples are *Stellaria media* (Åker, house, posthole), *Avena* (Nyhuset Haukstad, furnace), *Chenopodium album* (Valum gård, house area, posthole; Dæhlen, house area, posthole), *Hordeum vulgare var. vulgare* (Valum gård, house area, feature na.), *Hordeum vulgare* (Opstad Søndre, house, posthole; Rom Søndre, house, posthole; Vister, house, posthole), in addition to the undefined *Cerealia* (Dæhlen, house area, posthole; Glemmen Vestre/Nøkleby Vestre, house, wall ditch/ house, posthole; Rom Søndre, posthole; Skøyen, house, post; Vister, house, posthole).

The cluster analysis shows 11 groups of localities based on similar composition of taxa (fig. 2). The possible geographical patterns in the groupings of the dendrogram are visualized in a map (fig. 3) showing the localities in colours that correspond to the dendrogram cluster groups. The taxa that are common to the cluster group are displayed under the map (fig. 3); however, localities often contain more than the taxa that were common to the cluster (as seen in tables 1–2). The light blue cluster consists of 11 sites that have two taxa in common. Three trends are identified. First, most sites across the studied area have little botanical macrofossil diversity (see light brown, grey sites; fig. 3). Second, some sites are highly diverse and are concentrated in specific areas (see brown, yellow), especially in the north of the study areas.

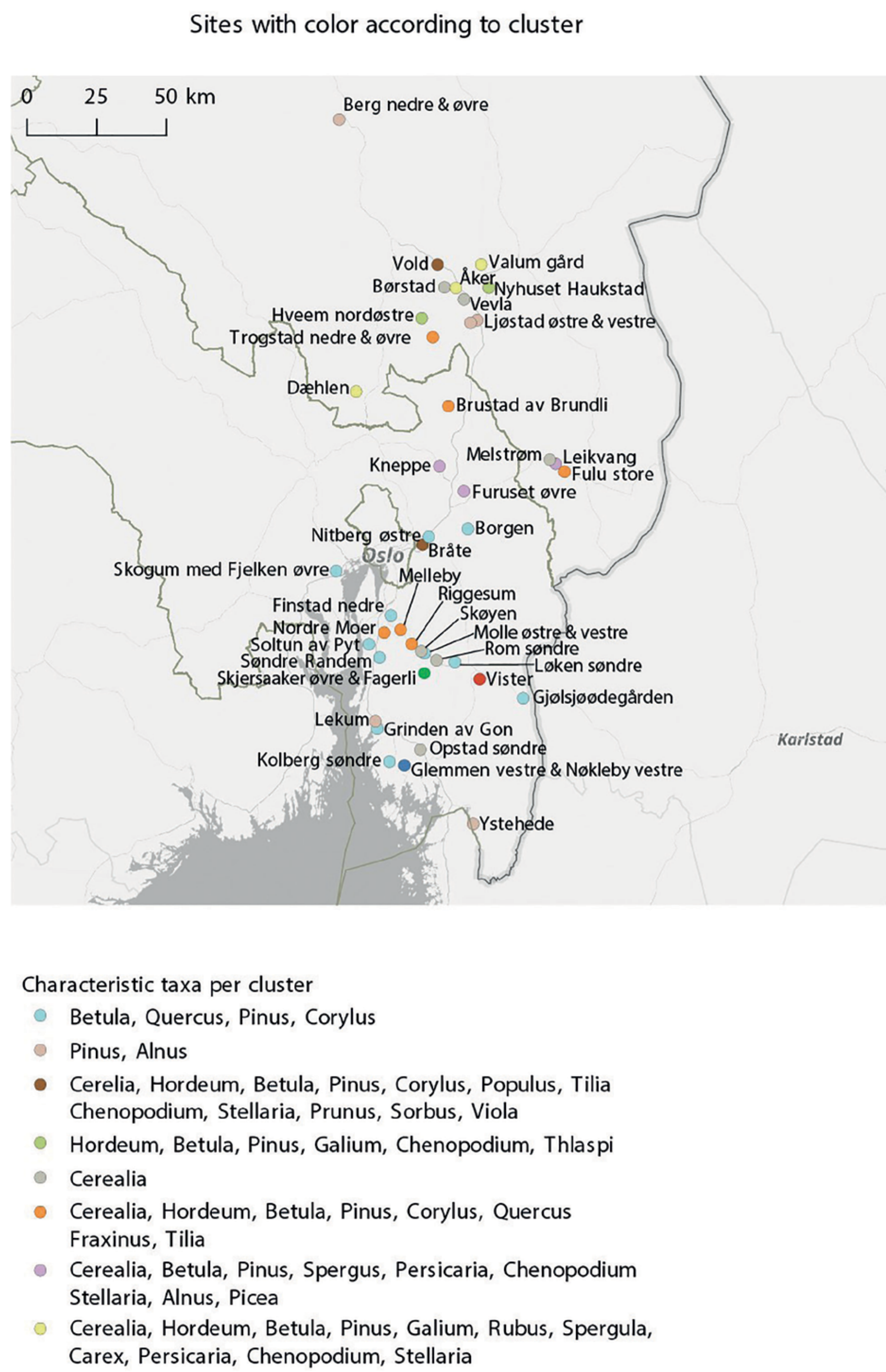

Figure 3. Map showing counties Viken and Innlandet. Sites have colors that correspond with how they cluster in the dendrogram (fig. 2). Taxa that are common to a cluster group are displayed under the map. Individual localities may hold more taxa than the taxa common to the identified cluster group.

Whilst highly diverse sites are usually found in the north, the three most diverse sites (Vister, Glemmen Vestre, and Nøkleby Vestre) are found in the south of the studied region.

Discussion

The majority of archaeobotanical samples are taken from houses within settlements, which offers potential for studying human utilization of plants in these settlements. Samples from other site-types, as well as contextual samples from the outfield of archaeological localities, would be of great interest to better understand the dynamics between infield and outfield, as well as to broaden the understanding of various use areas of plants in the past.

The results reveal a positive relation between the diversity of features in a site, the diversity of macrofossil botanical taxa, and the quantity of samples. This could indicate that human-plant interference has been diversely distributed in the different sites, and potentially that macrobotanical traces can be taken as indicators of past activities. No significant correlation between macrofossil diversity and specific structure and features was identified. Cultivated plants defined as *Cerealia* (*Avena* sp., *Hordeum* sp., *Secale* sp., *Triticum* sp.) appear significantly less in hearths and production pits than in other types of features. This may be an indication that the processing of cereals, roasting and drying, have not taken place in production pits, and not in random hearths, but may have been organized around specific hearths in the locations, such as in Gjølsjøødegården in Viken where one hearth in the north of the house has been identified as being for roasting purposes (Kile-Vesik 2016).

Macrofossil diversity correlates with the number of herb samples, but not with the general number of macrofossil samples alone. This can be illustrated by the most species-rich locality (38 taxa) in Viken, Skjersaaker Øvre/Fagerli, which has a total of 485 macrofossils, of which 4 are cereals, 164 are herbs, and 317 are trees. Opstad Søndre and Nitberg Østre in Viken have only 5 taxa. In Opstad Søndre these are spread over 1,211 macrofossils, of which 1,208 are from cereals, none are from herbaceous plants, and three are from trees. Nitberg Østre has a total of 215 macrofossils, of which none are from cereals, none from herbaceous plants, and all 215 are from trees. The more macrofossil samples we have of herbaceous plants in a locality, the higher the diversity, which is clearly illustrated with Åker, the most species-rich locality in Innlandet, with 50 taxa, spread over 4,533 macrofossils, of which 2,787 are cereals, 1,605 are herbs, and 141 are trees. The least species-rich locality in Innlandet is Berg Nedre and Øvre (9 taxa). It has a total of 56 macrofossils, of which 5 are from cereals, 12 are from herbaceous plants, and 39 are from trees. Thus, a locality can be rich in cereal or tree macrofossils, but at the same time poor in species diversity. So what does this mean?

The correlation between herb samples and species diversity may be obvious because the Nordic flora of herbaceous plants is greater and more varied than the number of cereal varieties or species of trees. However, the result is also a reminder that changes in biodiversity, human-plant interactions, and plant practices can be revealed from studying the rich material of herbaceous plants.

Sites with high numbers of macrofossils may be a sign of more cultivation or harvest activity in an area, but can also be a result of more or specific sampling during the excavation. Moreover, since charcoal and cereals are targeted for dating purposes, trees and cereals may be overrepresented in the samples. The soil quality and preservation conditions also affect the sampling results. Seeds from different species are preserved in both varying quality and in varying quantity, where the most sturdy plant parts and the species producing the toughest and/or largest seeds may be overrepresented in the samples. Some plants are more prolific seed-producers than others: for example, *Chenopodium album* produces on average 3,000 to 70,000 seeds per plant (https://www.cabi.org/isc/datasheet/12648).

Some macrofossils may be over-represented in archaeobotanical reports because of the difficulty in distinguishing between modern and archaeological specimens (Mueller-Bieniek *et al.* 2018). The appearance of many species associated with "disturbed" ruderal soils has been used as indicative of human activity (Behre 1981), yet these plants could have been key foods and medicines in the past, potentially tended, managed, or even cultivated around sites (Richer and Gearey 2017). A recurrent methodological problem is mixed soil as a consequence of post-deposition taphonomic processes, such as bioturbation, erosion, natural redeposition, and subsequent cultural activities (cultural redeposition) (Høeg 1996:9–10). Bioturbation causes uncertainties about the original deposition of seeds. However, a larger quantity of macrofossils can be seen as an argument for the macrofossils being "old" and originally deposited, since there will be less chance that bioturbation has influenced a large bulk of seeds than single found seeds. Consequently, there should be a potential in discussing use areas for herbaceous plant remains found in large quantities. Some of the presented sites above have representations of bulks of macrofossils in large quantities (>50) in postholes, defined or undefined cerealia, *Chenopodium album* and *Stellaria media*. Cereals are automatically interpreted as results of human use. But what about *Chenopodium* and *Stellaria*?

The lab analyses of macrofossils from Dæhlen suggest that the area in the excavation in which the samples of *Chenopodium* sp. seeds are found had been used in the household (Hellesøe and Skogsfjord 2010a:15 and appendix). The plant remains from the location are not treated individually in the report. However, the bulk of *Chenopodium album* can be dated via contextual finds to 180–60 BC. The archaeological report from Åker describes finds of seeds of *Stellaria media* together with finds of other typical "weeds" (Pilø 1994b), and none of these are considered potential sources in the interpretation of the place. Laboratories often distinguish between recently cultivated plants (food plants such as cereals, seeds, and berries) and "weeds" (Norw. ugress) (such as *Chenopodiaceae* sp., *Stellaria media* and *Centaurea cyanus*). However, the term "weed" reflects a modern understanding of often useful plants (Borgen 2020). The plants we consider weeds today may have been equally important to past settlers as cultivated crops. Indeed, many of these plants have likely been introduced to the Scandinavian area because of their value as food (e.g., *Aegopodium podagraria* and *Camelina sativa*) (Elven *et al.* 2018). The archaeobotanical lab report from Åker emphasizes the use value of *Chenopodium* as food, since seeds of the plant have been found in the stomach of one of the Danish bog bodies.

Both *Stellaria* and *Chenopodium* have been used for various purposes traditionally – especially as food and fodder (Grabowski 2014:19 with references). The first written collection of plants and their uses in a Norwegian context is Gunnerus's *Flora Norvegica* from 1776/1777 (Jørgensen *et al.* 2016). Gunnerus lists many plants used as food and fodder, but while he mentions *Stellaria* for such purposes, he does not mention *Chenopodium*. The ethnobotanical survey made by Ove Arbo Høegh in 1974 mentions *Stellaria* as fodder, but also as a useful plant for medicinal purposes, as a kind of dressing for wounds and skin problems, for dyeing, and for its ability to remove smell from hands after slaughter. He mentions the use of *Chenopodium* both as food and fodder. Gunnerus and Høeg diverge in their presentation of several plants, due to their different intentions, which in turn govern their source collection. Whereas economic growth coloured Gunnerus's collection of plant knowledge, Høeg was more interested in covering social and ritual practices, as well as medicinal ones (Teixidor-Toneu *et al.* 2020).

In Furuset Øvre, Ullensaker in Viken, two seeds of *Chenopodium album* were found in a pit potentially connected to a cremation burial. The finds are too few to provide a conclusive interpretation. Still, it could be interesting to draw attention to other graves with macrobotanical finds. Barley seeds found in a burial, barn, or grave field may be traces of different functions, e.g., ritual significance, fodder, or grave gifts. Two instances show the appearance of *Hordeum vulgare* L. (barley) in graves (Nordre Moer, Ås in Viken and Lekum, Eidsberg in Viken), however with only one seed each. The low quantity cannot be taken as an identification of an intentional deposit in either instance. But seeing the finds from different locations together may add a fresh perspective to the general understanding of how the plant has been used in the particular context.

The map showing regional variance in the period 400 BC– AD 400 (fig. 3) reveals taxa combinations in different sites. The yellow-colored excavation sites on the map have more herbs and fewer trees in common. The variety of taxa may also indicate that excavations in these sites have been carried out in soil layers where there was a more open landscape or cultivated area. The yellow sites include both *Cerealia* and *Hordeum*, which are typically recognized as cultivated crop plants. They also include the trees *Betula* and *Pinus*, as well as *Galium*, *Rubus*, *Spergula*, *Carex*, *Persicaria*, *Chenopodium*, and *Stellaria*, which are typically recognized as weeds. The similarities in sharing this diverse palette of species across localities indicate that they should be treated as useful herbaceous plants. The patterns in clustered areas are, however, quite distinct in the Viken and Innlandet regions. Brown-colored sites have many different trees, some quite short-lived: *Prunus*, *Sorbus*, *Corylus* etc. This could indicate that excavations have been carried out in layers where woods were chopped down and had opened up space for shorter-living trees, which again could be a sign of cultivation. These sites are recognized by *Cerealia* and *Hordeum*, as well as *Chenopodium*, *Stellaria*, and *Viola*. A number of trees are also identified in all these localities: *Betula*, *Pinus*, *Corylus*, *Populus*, *Tilia*, *Prunus*, and *Sorbus*. Orange-coloured sites have a collection of longer-living trees, perhaps indicating that excavation layers are from pre-cultivated areas. These localities are, however, also characterized by *Cerealia* and *Hordeum*, as well as the trees: *Betula*, *Pinus*, *Corylus*, *Quercus*, *Fraxinus*, and *Tilia*.

One site may have been used over a long period. Although houses, postholes and ditches may have been reused, the plant remains at a certain site can be used to date agricultural activity at the site (Hjelle *et al.* 2017) and possibly rituals, cooking activity, fodder storage, and foraging. The archaeobotanical remains may not only indicate the cultivation of crops, but also, through the large amount of herbaceous plant remains, provide a window into broader past activities, including animal husbandry, foraging for food, fodder, and medicine. These cultivation activities can in many cases also be traced in the excavation sites' place names, some of which have originated in the same period.

Place names may be dated based both on linguistic and on extra-linguistic criteria. For instance, the appellative *-vin* (meaning 'natural meadow, pasture') occurs in many Norwegian toponyms (e.g., Bergen, earlier *Bjǫrgvin*, 'mountain pasture') and may be dated based on a number of phonological factors. The *-vin* element (usually an ending in a place name) commonly triggers a variety of vowel assimilations (umlauts) on the place name element it is attached to, depending on the period from which the name derives. Older and younger ages of *vin*-names may therefore be distinguished based on phonological traits of the names. For example, Helleland (2003) shows that the name *Dæli* < **dal-vin* 'valley pasture' (vowel fronting **a* > *æ*) must pre-date ca. AD 600–700, when this particular assimilation, or umlaut (*i*-umlaut), ceased to be active. By contrast, the cognate name *Dolve*, also derived from **dal-vin*, must be somewhat younger since it lacks *i*-umlaut but displays *u/w*-umlaut (vowel rounding **a* > *o*), active ca. AD 700–800. A name without umlaut altogether, such as *Sandven*, must post-date both of these processes (ca. AD 800–1000). In this way, certain name elements have been dated to specific periods in Nordic language development. Apart from these linguistic criteria, vin-names are generally also lacking from newer Norwegian settlements in the western isles (ca. AD 800 –1000). Together these grammatical and distributional factors suggest that -vin place names date roughly to the Proto-Norse and Early Old Norse periods (ca AD. 1–1000, NSL 1997: 493–94). The oldest names in this dataset which may stem from the period under study include the appellatives *-vin*, *-angr*, and *-heimr* (typically in reduced form, e.g., *Borgen* < *borgvin* 'settlement pasture', *Skogum* < *skógheimr* 'forest home' etc.). Many of the place names in the dataset provide indications of continual cultivational uses, such as names indicating natural pastures, for example *Skøyen* < *skaðvin* (with an unclear element *skað-*) and more generally *Leikvang* < *leikvangr* 'sports meadow', *Bråte* < *broti* 'trees felled in a wood and left lying on the ground', *Åker* < *akr* 'field for tillage', and *Vister* < *vistir* 'dwellings', among others. Even though no absolute correlation can be drawn between the place names and the archaeobotanical remains in this particular study, the examples presented here may add some perspective to the potential in investigating past activity in a place using a combination of sources.

Concluding remarks

This article has investigated the distribution of archaeobotanical remains in 40 localities from the counties of Innlandet and Viken in southeastern Norway, dated to the period 400 BC– AD 400. All botanical macrofossils from these localities have been systematized using a set of parameters that makes both archaeological and botanical information visible. Macrofossils are found mostly in features and especially in construction elements. Macrofossil diversity correlates to the number of herb samples. The compilation of a larger dataset makes it easier to compare the appearance of macrofossils across sites and to consider regional variances. A regional variance between Viken and Innlandet is confirmed. The most species-rich localities are situated in Viken, in the south of the investigation area. Still, there are generally a larger number of herb macrofossils detected in Innlandet. The quantity of taxa and macrofossils that are not trees and cereals is striking. Wild plants must have been of value for some important activities being carried out in settlements and in the outfield, and they may have played cultural, social, and economic roles. Referring to wild plants as weeds in historical analyses limits the value of considering the herbaceous plants as useful plants because of attitudes held by many people today towards these plants. Their role in past societies should not be overlooked because of a contemporary view of these plants. First when such plant remains are more systematically treated in historical disciplines will it be possible to deduce more exactly how they may have been used. Place names with Proto-Norse roots offer deep historical perspectives on land uses at certain localities, where many provide direct indications of historical cultivation activity. We hope these combined results can inspire more systematic identification and investigation of both wild and cultivated plants within and across archaeological and historical disciplines.

Notes

1. The dataset is part of a database initiative in the research project *Nordic People and Plants* collecting archaeobotanical data from archaeological excavations carried out from the Museum of Cultural History, University of Oslo, from 1932 until the present. RCN SAMKUL funded project: Nordic People and Plants. Rediscovering and Safeguarding Nordic Ethnobotanical Heritage project no. 283364.
2. The University Museums practice different routines in sampling, analyses, and storage of archaeobotanical remains. Hjelle *et al.* (2017) describe the current situation for the university museums in Stavanger and Bergen.
3. The majority of excavations managed from the Museum of Cultural History are funded through the "polluter pays principle". When new construction projects are planned in an area of cultural heritage (i.e. often remains of human activity) and dispensation is granted from the "Heritage Protection Act", an excavation will take place to secure the remains for research and documentation. Excavations set out to raise and answer specific questions in combination with broad data sampling.
4. The recent county borders established during the Erna Solberg-government 2017–2021, are currently under public debate, and may be dissolved in favour of the old counties.
5. Ongoing work by Steinar Solheim, Kjetil Loftsgarden, and Frode Iversen, Museum of Cultural History, University of Oslo. See also Loftsgarden and Solheim this volume.
6. QGIS Development Team, 2021. QGIS Geographic Information System. Open Source Geospatial Foundation Project. http://qgis.osgeo.org), and modified in Adobe illustrator Cs6.

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Social dynamics at the Augland ceramic workshop: The introduction of soapstone in paste recipes from the Roman Iron Age and early Migration Period in southernmost Norway

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Abstract

This article focuses on the transmission of technological knowledge and social change at Augland in southernmost Norway around AD 200–450/60. In the first 150 years of this period the Augland artisans produced a regionally standard and relatively "frozen" set of pottery shaped by coiling/roughout techniques and tempered with granites (known as the *southern mode*), while the final century was characterised by a dual production mode that also included the manufacture of the novel and regionally distinct bucket-shaped pottery (known as the *western mode*). The latter was made using a markedly different plate/mould technique, eventually tempered with soapstone and asbestos. The social dynamics behind this technological change remain ambiguous, and the long-forgotten Augland site offers a unique opportunity in this regard, being the only known locality where soapstone tempering was incorporated into the southern mode. This study explores how and why the new material entered the production of the typical bucket-shaped type. At the same time, however, the evidence clearly indicates that potters experimented with soapstone for other ceramic pastes and shapes, even across crafts. We approach the material in four analytical stages: (1) analysis of raw material content; (2) evaluation of craft specialization; (3) fine-tuning the chronology for ceramic recipes; and (4) discussion of the social dynamics of knowledge transmission.

Keywords: Pottery, technological change, craft learning, social memory, soapstone, Roman Iron Age, Migration Period

Introduction

A major challenge for Iron Age settlement archaeology in Scandinavia is to be able to relate changes to living spaces to the everyday technologies and craft activities that took place there. The methodologies in use are simply better tuned to analysis of spatial organisation and landscape use than to studies of production. Consequently, it is notoriously difficult to assemble evidence for entire *chaînes opératoires* and to pinpoint these in space and time,

Figure 1. Map of Augland and its surroundings. Illustration: Steinar Kristensen, Museum of Cultural History, University of Oslo.

Figure 2. Different pottery techniques in use at Augland. Top: N-technique coiling typically used for handled vessels (Lindahl *et al*. 2002:23, fig. 10). Photo: S10905 from Nedre Valheim, Hjelmeland. Bottom: plate/mould technique used for making bucket-shaped pots (Kleppe and Simonsen 1983). Photo: S2268a from Nedre Valheim, Hjelmeland. Both photos: Terje Tveit, Museum of Archaeology, University of Stavanger.

and to identify with some regional precision just where and when changes to social organisation of production happened. A rare exception is the recent identification of craft milieus in south-western Norway during the Migration Period (AD 400–550) in which artisans decorated metal objects using Style I animal art and worked seamlessly across the boundaries between crafts using metals (gold, silver and bronze), glass and clay (Fredriksen *et al.* 2014). Another significant exception is the Augland settlement site in southernmost Norway (fig. 1), with a large ceramic workshop that flourished for at least 250 years before production came to an end around AD 450/60. Excavated in the mid-1970s, Augland has remained largely unexplored due to the lack of a comprehensive mapping and report, until recently (Fredriksen *et al.* 2020). During the first 150 years of the period we are spotlighting, the workshop milieu produced a range of pottery characteristic for the Late Roman Iron Age (AD 200–400) and widely distributed in southern Norway. Typically, the pottery is tempered with granite and shaped using either a form of coiling, known as the N technique, or a simpler roughout technique. The last century of production, however, is characterised by a dual production mode. A novel mode known as bucket-shaped pottery had been introduced by the end of the fourth century. The latter was made using a distinctly different plate/mould technique, and eventually tempered with soapstone and asbestos. Based on probable origins of the two modes, the regular pottery is here referred to as the southern mode and the bucket-shaped type as the western mode (fig. 2).

Significantly, Augland is the only known site with a documented merging of southern mode shaping techniques with western mode paste recipes, in particular the inclusion of large amounts of talc-rich steatite, commonly known as soapstone[1]. This makes the ceramic assemblage an ideal case study of how two production modes met and interacted, providing a unique opportunity for studying knowledge transmissions and their outcomes in a single workshop context. At Augland, the introduction of the western mode was followed by the introduction of soapstone as a temper, possibly as part of a wider societal development where a novel interaction network gained foothold and expanded. While the origin of this western mode is still a matter of debate (e.g., Rolfsen 1974; Jørgensen 1988; Lönn 2009), it is safe to assume that southwestern Norway, perhaps in particular Jæren in Rogaland (fig. 1), was a core area where its production gained momentum from a very early stage (Kristoffersen and Magnus 2015). Also, during this early stage it was primarily associated with cooking (Kleppe and Simonsen 1983). Interestingly, what seems to be initial experimentation with soapstone in ceramic pastes at Augland may be related to production of the "little cooking pot" (Bøe 1931), which is traditionally linked to the southern mode. This leads us to hypothesise that the dynamics between the two modes – and especially the collaboration between craftspeople with knowledge and skills within the respective modes – is the main driver behind the introduction and regular use of soapstone in ceramic pastes at Augland. Working from this hypothesis, we seek to establish when and how soapstone as a tempering agent was introduced, and to build a relative chronology of the technological process. We will do this by identifying key ceramic recipes and relating these to evidence of other crafts, in particular non-ferrous metalwork.

In a recent article (Fredriksen *et al.* 2020), we argue that coping with the new manufacturing technique slowly contributed to the downfall of the previously thriving ceramic craft milieu at Augland, which came to an end in the mid-5th century. The demise of the Augland workshop correlates with the roughly contemporaneous demise of the Fjære and Oddernes[2] elite milieus, two nodal points in a southernly oriented network with contacts across the Skagerrak (Skjelsvik 1961; Rolfsen 1976; Larsen 1990; Grieg 1990 [1939]; Rolfsen 1992:35–39; Stylegar 2006:208–213, 2007:82–99; Kallhovd and Stylegar 2014; Sæther 2018). Significantly, petrographic studies have established clear links between Augland and Fjære (Hulthén 1986:73–75). It is important to emphasise, however, that while production ended at Augland, the western mode continued to thrive until the mid-sixth century elsewhere, especially in western Norway.

The departure point for this examination is the co-existence of the two production modes, or technical groups (Roux 2017:107). The earlier southern mode culminated in the black-burnished wares (Bøe 1931), generally characterised by sophisticated coiling and drawing techniques, and in a wide repertoire of vessel shapes and stylistic features that remained relatively unchanged for at least two centuries. The ceramic tradition can therefore be deemed uniform, static or frozen (Rice 1996) and thereby characterised as a "closed learning network", with a strict and faithful reproduction of techniques and decorative style (Wallaert-Pêtre 2001:482–485). The bucket-shaped pots of the western mode were, on the other hand, made using a plate/mould technique that, at least in its early phase, was easier to copy by non-specialists (Kristoffersen and Magnus 2015:119). The available chronological data indicates that the western mode entered Augland in the second half of the fourth century, and that manufacture at the site ceased around 450–460 or shortly after (Fredriksen *et al.* 2020). This means that the co-existence of the two modes was characteristic for the workshop's last century of use. By identifying more accurately when and how the introduction of soapstone into potting took place at Augland, we will be in a better position to understand key factors behind this introduction, and the social dynamics of its continued use until the demise of the workshop.

In the following, we will:

- Give a general overview of the site and discuss the raw material contents of the western mode.
- Evaluate the organisation of production, craft specialisation and technological change.
- Provide a relative chronology for Augland's ceramic recipes in the final century before production came to an end around 450/60.
- Discuss the dynamics of knowledge transmission, by relating the introduction of novel raw materials and shaping methods to the broader societal context. Evaluate the technological changes and assess the most likely regional sources of origin for the soapstone used at Augland.

State of research on the Augland site

In 1974 and 1975 the Museum of Cultural History (KHM) in Oslo excavated the Augland site, situated west of the river Otra in Kristiansand, Vest-Agder, Norway (Rolfsen 1980). The unearthed area of approximately 2500m^2 lay on a stream terrace 20 metres above sea level, surrounded by river valleys (fig. 1). The unusually large production site was primarily centred on potting. However, evidence of non-ferrous metalwork and iron smithing clearly indicates cross-craft knowledge exchanges. The artefact material includes glass beakers, jewellery, beads, spindle whorls, arrowheads, knives, files, fishhooks, fishing sinkers, whetstones, crucibles, smoothing stones, slags and burnt bones (Rolfsen 1980:15).

The lack of a report including mapping from the original excavations has hindered substantial work on Augland. Information has been extracted from shorter articles (Rolfsen 1980, 1992; Stylegar 1999, 2006, 2007) and municipal reports[3]. The Augland excavations uncovered a total of c. 55,000 ceramic fragments, moderately estimated by the excavator to represent 700–800 vessels of the regular southern mode and c. 80–90 vessels of the western bucket-shaped mode. Most likely, however, the total number of vessels is significantly higher. The excavations revealed four rectangular house plans as well as a pit-house and a circular dug-down house (Rolfsen 1980, 1992). The house plans all contain postholes and firepits. In between these house plans four basins of raw clay and 14 kilns were unearthed, as well as a range of other structures, such as graves, charcoal pits, cooking pits, slag pits and refuse pits (Rolfsen 1980:85–87, 1992). Seventeen radiocarbon (^{14}C) dates from the site have so far been established. These range from 170 BC to AD 650 (cal., 2-σ), with a peak of activity in the third and fourth centuries AD. The activity ground to a halt around AD 450 (Fredriksen *et al.* 2020).

The potters did not need to travel far to find clay. The clays in the preparation basins, characterised by Hulthén (1986:65) as silty, fine, rich in biotite mica and iron (Fe) with low levels of calcium (Ca), most probably originate from the river valley next to the site (Rolfsen 1980:16). This initial interpretation was supported by Hulthén's (1986:59–61, 76–77) study. Hulthén (1986:65–73, 77–78) also classified the ceramic assemblage into five groups. This was based on clay and tempering materials, shaping techniques, surface treatment, decoration, and firing method. Her groups A–D correspond to the dominant southern mode, characterised by the use of local clays mixed with crushed granite. Hulthén further narrowed group A-D into two main types: 1) fine grained vessels constructed by the N-coiling technique (groups A and D) employed for serving food and drink, and 2) rougher pastes associated with roughing/drawing technique (groups B and C) for cooking and storage. The firing method was uniform for Groups A–D: reduced firing conditions and a temperature range between 600 and 700 °C (Hulthén 1986:73–77).

Significantly, Hulthén's Group E is markedly different. This refers to the western mode bucket-shaped pottery. Materials seem to have been brought in from neighbouring areas to the northwest. Hulthén identified the use of sand, granite and talc as tempers, and found asbestos (e.g., chrysotile) in some samples (see footnote 1). The average tempering (above 50%) is significantly higher than for the southern mode. The resulting wares are more heat-resistant, leading Hulthén (1986: 79) to argue that the type had a different function.

Bucket-shaped pots – the raw material

Bucket-shaped pots do not seem to relate to any known ceramic type before their sudden appearance in the mid-4th century, and they are clearly distinctive from contemporary types. The type normally features straight-walled or slightly convex vessels, typically with a P-shaped rim and a capacity of 1–1.5 litres.

The sequence for bucket-shaped pottery consists of the three broad Phases I-III (Fredriksen *et al*. 2014). In Phase III, the pots often have remains of, or indications of, an iron band below the rim. The production of high-quality vessels of the western mode in Phases II and III is defined by the use of specially carved stamps and a "surface-covering expression" (Fredriksen 2006:130, table 1). This expression was intimately linked to metalworking milieus using Salin's Style I animal art, and imbued in a rich mythological universe (Fredriksen *et al*. 2014:123).

One of the most significant features of bucket-shaped pots is the extraordinarily high proportion of non-plastic inclusions, often up to 80% and possibly even 90%, predominantly asbestos or soapstone, or a mix of the two (Kleppe and Simonsen 1983:18; Rolfsen 1986; Kleppe 1993; Engevik 2008:130–132). In general, asbestos seems to be most popular in western Norway (Vestland), while soapstone dominates in the southwestern parts of Norway, predominantly in Rogaland (Kristoffersen and Magnus 2010:56, see also fig. 1). The reasons for the high proportion of non-plastic material remain unknown. Kristoffersen and Magnus (2010:10) observe, in relation to the bucket-shaped pots, that the clay first and foremost seems to act as a binder for the minerals that are added to the paste.

The thermodynamic qualities of soapstone

Nearly a century ago, Johs. Bøe (1931:170–171, 204–213) argued that the high proportions of asbestos/soapstone in bucket-shaped vessels helped stabilize the ware during drying and firing, and thus helped to maintain the pots' delicate shapes. The identification of crusted proteins in some pots has offered support to the argument that their initial use was for cooking (Kleppe and Simonsen 1983:16; Engevik 2002, 2008; Kristoffersen and Magnus 2010:10, 15; Fredriksen *et al*. 2014), prior to becoming serving vessels (Fredriksen *et al*. 2014).

A brief survey of the available literature on the use of soapstone as temper beyond the study area serves to confirm the relevance of the mineral as a stabilising agent during the firing process. Extensive testing already in the 1920s concluded that talc as a body material may be introduced in considerable quantities without affecting the working properties of the body (Ladoo 1923). Later work confirms that soapstone fired to temperatures between 800 and 1000°C undergoes mineralogical changes that increase its hardness (Rapp 2009:125). In addition, more recent archaeological experiments point out that the partial fusion of the talc led to an increased length of the liquid phase, resulting in an increase in compressive strength and mechanical resistance (Torres *et al*. 2015). Archaeological examples include a recent study of prehistoric pottery from Milla Skerra, Shetland, with frequent use of soapstone as temper. Olivia Lelong (2019:92) argues that the tempering would increase the ability of the pottery to withstand a wider range of temperatures and perhaps also enhance its burnished appearance.

These examples underscore frequent claims that high percentages of asbestos and soapstone provide increased heat resistance (Kleppe and Simonsen 1983:16). However, several commentators (e.g., Magnus 1984; Jørgensen 1988) have cast doubt on the assertion that this feature made vessels more useful for cooking. Recent experiments by Tine Schenk tested the thermodynamic properties of bucket-shaped pottery when fired with mixes of 25%, 50% and 75% soapstone content. She concluded that the soapstone proportions do not seem to be tied to the production process or to stabilising properties. However, the heat treatment seems to be of aesthetic significance, as vessels take on a metallic appearance when fired at temperatures in the 500°C to 750°C range (Schenck 2015). Significantly, this metallic appearance possibly links the pots to metallurgy and gold smithing (Fredriksen *et al*. 2014). It should, however, be noted that many bucket-shaped pots were fired at temperatures below 500 °C (Hulthén 1986). Interestingly, carved soapstone bowls have been used throughout most of the Iron Age and medieval period in Norway[4], and were in use both prior to and after the period of bucket-shaped vessels (AD 350–550). Analyses of food crusts in carved stone vessels show that the contents had occasionally been heated to up to 300°C (Brodshaug and Solli 2006:299–301). This evidence for vessels made of 100% soapstone may also be of relevance for bucket-shaped vessels with soapstone content in the 50-90% range, as it clearly indicates that high contents did not weaken the thermodynamic qualities of cooking vessels.

Importantly, the western mode was present at Augland for a century before ceramic production ceased (Fredriksen *et al*. 2020). While the minerals were mined regionally in western and southern Norway (see map over known quarries in Hansen and Storemyr 2017:15, fig. 14), there may also have been influences from the continent. The Romans brought Alpine soapstone vessels to their northern limes, and the soapstone vessels may well have been appreciated by northerners with connections to these areas (Rapp 2009:125–128; Storemyr 2015:27–57).

Craft specialisation (technological change) at Augland

Ethnographic work has shown that shaping techniques are a key to understanding changes to ceramic recipes (Gosselain 2008, 2011). Shaping requires learning over time, and is therefore related to group identity more often than other *chaîne opératoire* stages. However, while usually a resilient and stabilising factor, the shaping stage may also reflect conditions for sudden social changes (Gosselain 2011:214–221). When such shifts occur, key factors to consider are relocation of craftspeople, altered social identities, new producers and new identities coming in, and new connections between different learning frameworks (Roddick and Hastorf 2010:164–167 with references).

At Augland, the southern mode had been steadily reproduced for at least 150 years when the western mode appeared. The two modes represent two forms of learning networks (Miller 2012:229–233, fig. 11.1), with either *closed* or *open* abilities (Wallaert-Pêtre 2001:482–485). A relatively closed learning network is characterised by behaviours leading to a strict and faithful reproduction of style, while a more open network has an adaptability to unknown situations and a partiality for trial and error learning (Wallaert-Pêtre 2001:482). While the southern mode of production at Augland fits the description of a closed network well, the first phase of the western mode seems relatively open, without a distinct hierarchy of learning, as the vessels are fairly easy to copy. In another article we argue that this meeting of traditions led to the collapse of the Augland site over time, as the two modes were unable to coexist when the ties to southern Scandinavia were severed by a regional power shift (Fredriksen *et al.* 2020). Importantly, a simple replacement of craftspeople can be ruled out, as both modes of production seem to have continued side by side after the introduction of the western mode. A more plausible possibility is that the knowledge of the novel, easy-to-copy work mode with a flat organisation was brought to Augland by artisans who originated in communities to the northwest, where it seems to emanate from, or at least travelled via connections with these communities (Bøe 1931:166, 170; Kleppe and Simonsen 1983:36; Kleppe 1993:293, but see the discussion in Engevik 2008:16 for other points of view). In the following we discuss two main alternatives for the provenance of soapstone at Augland: namely Rogaland and the Fjære area. However, such a fine-tuned culture-historical discussion requires, first, a clarification of the chronology at Augland.

Chronology

A Bayesian model of the available radiocarbon dates from Augland places the end of the site in the period AD 340–495 (cal., 2-σ) (Fredriksen *et al.* 2020:454, fig. 4). Typologically speaking, the production of pottery with soapstone-tempered wares clearly fits within this frame. However, here we seek to narrow the frame, by relating the radiocarbon chronology and the ceramic typology to other forms of material culture.

According to Bøe (1931:166–172) the origin of the first bucket-shaped pots can be traced to Rogaland, specifically the northern parts of Jæren, in the mid-4th century[5]. These pots are tempered with finely ground sand. He argued that the clay recipes rapidly became tempered with asbestos or soapstone, but did not specify subsequent development, and it is not possible to close in on a more precise date. As indicated with respect to Augland, the following generation might have worked using the results of trial and error, in an open network, until around the turn to the 5th century. Consequently, the production of soapstone–tempered ware of both modes at Augland most probably took place after this time. From a typological point of view (cf. Kristoffersen and Magnus 2010), there are few indications of ceramic production at Augland after c. 450–460 (Fredriksen *et al.* 2020:460). As previously mentioned, production vessels of the western mode were intimately linked to metalworking milieus (Fredriksen 2006:130, table 1). This collaboration with metal crafts artisans would be a potter's way of working – something that s/he had brought from a different learning network where this was already common practice. Indeed, the excavations indicate that metalworking took place alongside potting at Augland (Rolfsen 1980:15, 18). Our macroscopic observations of the metal artefacts recovered at Augland establish that non-ferrous metalworking most likely took place in the period AD 350–450, thus confirming that there were concurrent developments of potting and metalworking during the final century of production at Augland. Four copper alloy fibulas, a cruciform brooch and three small-long brooches define the end phase (fig. 3). These are the only brooches that relate to the activity of the Early Iron Age on site[6]. The cruciform brooch is of Reichstein's (1975:36, abb. 32) type Eine, dated to the first half of the fifth century. The small-long brooches are more difficult to date, as no clear sequence has been established (Rogers 2007:118–119; Røstad 2016:272 with references). Haakon Schetelig (1911:61–68) placed the type mainly in the late Merovingian Period, but two of the three have divided/undivided lozenge-shaped feet (*takfot* and

Figure 3. One cruciform and three small-long brooches from the Augland site. Photo: Christian Løchsen Rødsrud. Assembled by Ingvild Tinglum Bøckman.

planfot) that seem to mirror the larger silver-foil/relief (cross-headed) brooches (Hansen 1970:65–66, Figs. 61–62; Sjøvold 1993:16–17, Group A, type 11 and 12). This indicates that the two brooches date to AD 350–450, most probably the latter half of this time period. Consequently, metalworking at Augland most probably ended not long after AD 450. This resonates well with the radiocarbon evidence, which clearly indicates that activity declined rapidly after AD 450.

A three-stage sequence for paste recipes and knowledge transmission

We have conducted a macroscopic survey of the entire ceramic assemblage, selecting samples that were clearly marked with reference to the spatial distribution grid from the 1974–1975 excavations and following Kristoffersen and Magnus's (2010) updated typological framework. The result is a broad classification of the material into four ware types: black burnished wares (So), table wares (Bo), bucket-shaped pottery (Sp), and miscellaneous cooking wares (M).

In a previous study, we sorted the Augland pastes using a portable X-Ray Fluorescence (pXRF) device. The dataset could be divided into four main clusters of ceramic pastes (fig. 4), of which Clusters 1–3 (tab. 1) contained diagnostic bucket-shaped wares (Fredriksen *et al.* 2020).

For the current analysis, clusters 2 and 3 are of particular relevance (tab. 1). While Cluster 2 comprises all four ware groups and contains several examples of subtle crossovers between the western and the southern mode, Cluster 3 is characterised by very high contents of soapstone temper, clearly visible to the naked eye. Especially striking is the closeness between some bucket-shaped wares of the western mode and specific samples of the southern mode: in at least two instances bucket-shaped vessels and serving vessels (Bo) of the southern mode may well come from the same prepared batch of clay. The black-burnished wares, on the other hand, stand out as a separate group, seemingly linked to a highly specialised set of skills for surface treatment and shaping using N-technique coiling (Hulthén 1986). There is, however, a degree of similarity between recipes made using the simpler roughout technique without black burnishing and those made using the plate/mould technique.

The macroscopic analysis also reveals that several sherds of vessels made in the southern mode are tempered with soapstone. We have examined all available sherds with soapstone temper, and the material is homogenous. The majority of tableware sherds with soapstone temper belongs to Bøe's (1931:156–164) "little cooking pot" (R.364/365) group. Typologically, R.364/365 extends further back in time than the bucket-shaped vessels and is traditionally linked to southern and eastern Norway. This indicates that the earliest experimentation with soapstone within the western mode was primarily with this type. This observation corresponds well with the argument that the invention of the bucket-shaped pots was related to changes in culinary practice (Kleppe and Simonsen 1983).

The main factor in these dynamics is most likely cross-craft collaborations between artisans (Budden and Sofaer 2009; Brysbaert 2011; Rebay-Salisbury *et al.* 2014). However, there is also the possibility that craftspeople at Augland were already well aware of the thermodynamic

Cluster/ Recipe	Stage in Phase I	Recipe definition	Characteristics	ID of likely same-batch examples (ware thickness)
1	Early	Light-coloured, sandy, dry, fine-ground, local materials	Recipe adopted from roughout technique types (Bo, M)	Sp L60, Bo L50, M G30 (5 mm)
2	Middle	Darker, more heterogenous, sand, mica, some imported soapstone but mostly local materials	Transitional recipes merging with roughout technique types (Bo, M) and the N technique type (So)	Sp F60, Bo I60 (5 mm) Bo M60, M K45 (11 mm) Sp G30, Bo I55 (7 mm) Sp M60, So L50 (5 mm)
3	Late	Darker colour, high soapstone content (<50%), mostly imported materials	Distinct pastes with early Phase II characteristics, clearly separate from N technique (So), a few Bo examples of paste use	Sp F60, Sp D45 (3 mm) same ware as Bo M65 (10 mm)

Table 1. Clusters 1–3 as a relative chronology for the terminal century at Augland. Definitions and main characteristics of recipes, and identified matches of samples most likely belonging to same paste batch.

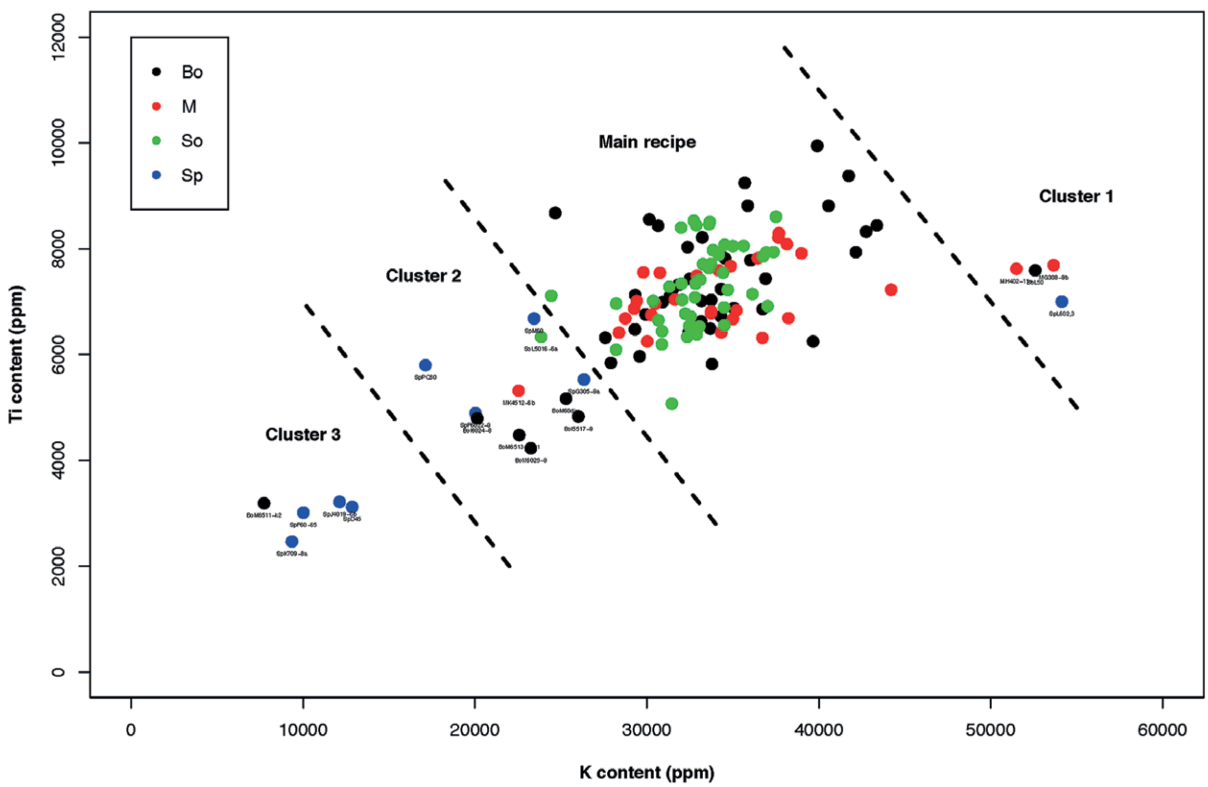

Figure 4. K-Ti plot of the Augland pXRF data. Stippled lines indicate grouping into Main recipe and Clusters 1–3. Illustration: Fransesco Caruso, Schweizerisches Institut für Kunstwissenschaft.

qualities of soapstone, as it was in use for other forms of material culture throughout most of the period of ceramic production at Augland. In other words, while it is likely that the introduction of the newcomer mode and its tempering materials was brought to Augland by new artisans with different skills, the evidence of cross-fertilizing between the two modes in the final phase at Augland indicates that craft learning consisted of experimentation. It is, however, clear that the artisans eventually mastered both the southern and the western mode, being able to use the soapstone-rich western mode recipe in new ways. Evidence for this lies in the ceramic assemblage from Augland, which includes many examples of hybrid forms appearing in the terminal stage of ceramic production there. The collection originally included a complete R.364/365-vessel with a high content of soapstone[7], the only one known of its kind. Numerous sherds (fig. 5) bear evidence of the experimentation with the new recipe.

To sum up briefly so far, we argue that the ceramic production at Augland developed in three stages. The first stage consists of at least 150 years of production of southern mode pottery. This is followed by the introduction of the western mode, and the sequence ends with a stage where artisans experimented with soapstone (and most likely asbestos) as temper within both modes. Significantly, this chronology establishes that the terminal stage at Augland

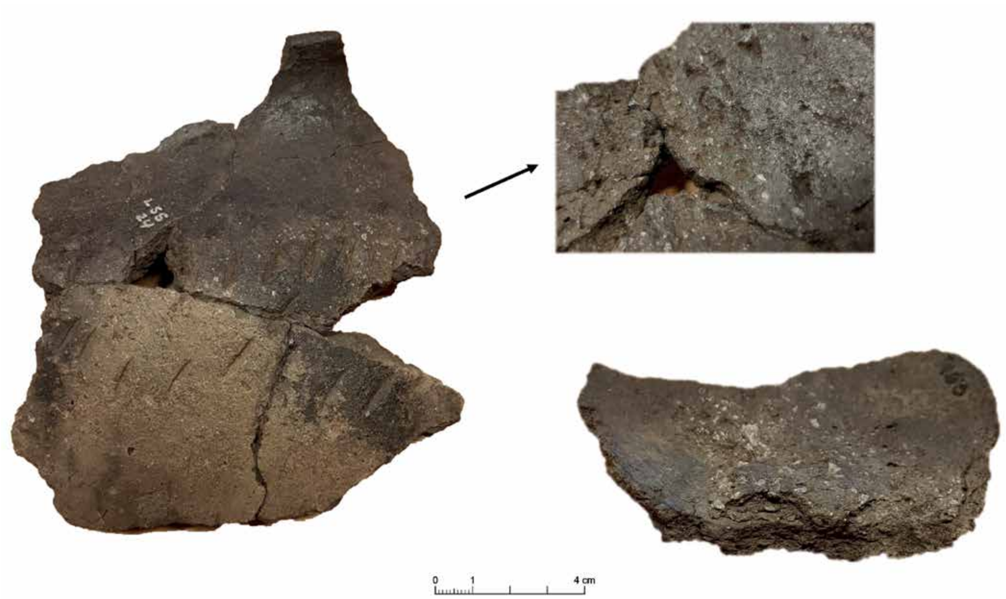

Figure 5. Left: example of soapstone tempered vessel of southern mode (R.364/365) with arrow pointing to a zoomed photo of the inside. Bottom right: vessel with combination of traditional paste with a second layer of soapstone tempered clay inside. Photo: Christian Løchsen Rødsrud.

took place within a timeframe of around five decades, between AD 400 and 450. This means that it did not extend much beyond a generation or two, perhaps even being within the lifetime of a craftsperson.

Introduction of a new raw material to paste recipes

Ceramic practices normally cite earlier customs and events (Lucas 2012:195–201), and the recipes for making specific forms of material culture were deeply tied to the identity of craftspeople as makers of social memory. Most likely, this means that potters at Augland tested how the new western mode recipe would work within the framework of the well-known cooking pot. The experimentation began before the introduction of soapstone, with the production of bucket-shaped pots using the southern mode technique. Consequently, a feasible explanation is that new potters arriving at Augland from the core areas of the western mode introduced the new mode. This led to an interweaving of two learning networks at Augland, a merging of knowledge from two different *communities of practice*.

The community of practice concept describes a group with a shared history of learning (Crown 2014), in this case the southern mode. The recipes of a specific practice community are defined as repeated patterns common to potters with a shared understanding of the "rules" for making a specific repertoire of socially acceptable vessel types (Wenger 1998). The new and more open mode might have been introduced via visitors from the northwest. During this time period it is not unlikely that there were instances of intermarriage, bringing potters from one area (and ceramic tradition) to another. We have seen that the two modes merged in hybrid forms during the third stage of production at Augland, using a paste recipe typical for bucket-shaped pots. Such hybridity may well suggest the creative merging of firstcomer and newcomer modes of production in the works of a new generation.

The ceramic production at Augland ended around AD 450 or slightly later, which approximately coincides with the transition to Phase II for bucket-shaped pottery in southwestern Norway. Phase II is characterised by a high degree of experimentation, while gradually becoming a more closed network (Fredriksen *et al.* 2014:123). The Augland potters were clearly not part of this process in Phase II (see Fredriksen *et al.* 2020). As we have seen, Augland became increasingly woven into a network that included the western production mode during the workshop's third and final stage. Consequently, understanding the flow of the new materials in use during this stage is a key to understanding the developments in ceramic production in this part of Scandinavia.

Where did the soapstone used at Augland come from?

Bøe's (1931:166–167) observation that the earliest bucket-shaped pots were tempered with sand remains widely accepted (Engevik 2008:132; Fredriksen *et al.* 2014:4). Our previous work indicates that there are crossover-examples without soapstone-temper (tab. 1, cluster 1 and 2).

Precisely how the soapstone came into use as a temper, however, remains unresolved. When recipes containing soapstone appeared at Augland at the very beginning of the 5th century, it seems to be a second pulse of impact from the western mode. The wares that appeared after the second pulse compare well with the thin-walled (<4 mm) vessels that are typical of the fifth century. This new variant of the western mode clearly represents a different *chaîne opératoire* than the southern mode, and cross-craft contacts were probably a key factor.

Soapstone was not locally available for the Augland artisans. In our opinion, the current evidence supports two possible scenarios of how the soapstone was introduced. In the first scenario, soapstone was brought from the north, the Rogaland or southern Vestland counties, via contacts from within this core area for production of bucket-shaped pots. This would have involved transportation of soapstone, along with the knowledge of how to make the new clay recipes. In the second scenario, the invention of soapstone temper occurred through local experimentation. This alternative draws attention to a possible origin to the northeast in Aust-Agder. Even though the production of carved soapstone bowls seemingly came to a halt in southern Norway in the first century AD (Pilø 1990), there is ample evidence for the use of the mineral for a range of other purposes during the lifetime of the Augland workshop, for example for spindle whorls, fishing sinkers and other weights (Rolfsen 1980). This implies that soapstone was still in use in the period and that the material was available at Augland via various cross-craft exchanges.

Given that the core area of production – and most likely the origin – of the western mode was in western Norway, we currently find the first scenario to be the most probable. This scenario implies that both raw material and technological influence came from Rogaland/Vestland, the core area for soapstone-tempered bucket-shaped pots (Engevik 2008:170-171). There are several known quarries in northern Rogaland, mostly in the vicinity of Haugesund (see fig. 1). A small selection of sites has yielded prehistoric finds, such as Årabrotsmarken, Nora Grønevik and Ilibrotet (Skjølsvold 1961; Hansen and Storemyr 2017).

However, the evidence of close contact in the eastward direction may indicate that initial procurement of soapstone was from quarries to the northeast, which were located closer to Augland than those to the northwest were. The closest known quarries are located in Fjære and Landvik, some 50–60 kilometres to the northeast, although these are primarily associated with Viking period activity (Skjølsvold 1961; Schou 2007, 2017). Hypothetically, soapstone could also have been transported to Augland from Hisåsen (Skjølsvold 1961; Schou 2007:47–48) near Lillesand. This second scenario is particularly interesting in light of the concurrent demise of the Fjære and Oddernes elite milieus, where Augland was part of the latter, and of the southern network stretching across the Skagerrak. Most archaeological work on soapstone has focused on locating quarries and on sourcing large objects like bowls, bake stones and the building materials of churches. Such material is mostly dated to the Viking and medieval periods. However, raw material for production of smaller items that were in use throughout the entire Iron Age, such as loom weights, spindle whorls, casting moulds and fish net sinkers, must also have been quarried, although their extraction and ensuing craftwork have received far less attention (Hansen and Storemyr 2017:18). The use of quarries for small-scale production left fewer traces and is more difficult to date. Importantly, regardless of entry route, the soapstone arriving at Augland for production of spindle whorls or other items would have been available for the potters. A recent study provides an excellent departure point for future work. Gitte Hansen *et al.* (2017) have been able to link a high percentage of vessels in Vestland to known quarries. This indicates that it should be possible to trace the sources of soapstone found at Augland.

Concluding remarks

While the potters at Augland had developed a closed learning network (southern mode) with highly specialized skills over many years, a new (western) mode of production entered the site in the late 4th century. The western mode originated in a relatively more open network, and was a markedly different technique that was easy to learn for the skilled Augland potters. Knowledge transmission was enabled by the exchange of ideas with artisans coming from other production areas. The initial introduction of the western mode in the second part of the 4th century is the first pulse of influence. This is demonstrated by crossover examples where local artisans made bucket-shaped pots using southern mode wares. In the second pulse, soapstone was introduced into the recipes. This introduction of a new raw material may be connected to a relocation of artisans that mastered the plate/mould technique and used tempering agents brought to Augland from a neighbouring region. In the third and terminal stage at Augland, the artisans seem to have experimented with, and mixed, the two production modes, since we identify examples of hybrid ceramic technology.

Based on regional mapping of known soapstone quarries we suggest two main directions of import, from the northwest and the northeast. For both options it cannot be overlooked that there are clear links between Augland and Fjære, and that the two milieus seem to end concurrently. Future research should seek to link the soapstone at Augland to a wider regional landscape. Our analyses suggest a fairly homogenous soapstone material, and it is quite likely that the raw material at Augland came from one single source.

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Notes

1. Tempering with levels of soapstone and asbestos comprising above 50% of the ware is a common feature of the western mode pottery (see e.g., Engevik 2008) – a distinct feature of this particular mode. While Birgitta Hulthén (1986:79) found asbestos (e.g., Chrysotile) in some samples, this temper type was not found in our analysis. The most likely reason for this is that all samples with visible asbestos tempering were sent to Hulthén for analysis.
2. Augland was most likely part of the Oddernes milieu.
3. All sample IDs in this study refer to the excavations' original coordinate system, and may therefore be spatially plotted if and when the report is made available.
4. The question of how these stone bowls developed is still unresolved. Their origin is probably to be found in western Norway, where evidence of ancient soapstone mining occurs most frequently (Skjølsvold 1969, see also map in Hansen and Storemyr 2017).
5. Rolfsen (1974) argued that the bucket-shaped type originated around the turn to the 4th century AD, casting doubt on evidence that had been used to support an origin in Jæren. His argument is based on typologically dated burial contexts that seem to pre-date AD 350. However, this argument does not consider the likelihood that the contexts may contain antiquities (cf. Kristoffersen and Magnus 2010).
6. A fragment of a Viking Age brooch has also been recovered, but its relation to the production site remains unclear.
7. Unfortunately, we were not able to retrieve this vessel, known from illustrations and an earlier, preliminary survey of the collection.

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Activities and community organization in Roman Iron Age Vik, Ørland, Central Norway

Ingrid Ystgaard

Abstract

The degree of nucleation of settlement is important to our interpretation of the organization between contemporary farmsteads in the Roman Iron Age, but the presence of a work community, economic coordination, and social cohesion is of even greater importance. In this paper, I explore how these factors can be discerned from an analysis of activities and tasks performed in three neighboring Roman Iron Age farmsteads excavated at Vik, Ørland, central Norway. Such an analysis is possible thanks to preserved waste deposits containing organic material. The farmsteads were independent units, each providing their own subsistence. At the same time, they related to each other, and mirrored each other's activities and spatial organization. Also, surplus production was divided and coordinated between the farmsteads. This could potentially have been initiated from an outside central farm, but most likely surplus production was organized between the inhabitants of the three farmsteads.

Keywords: Roman Iron Age, village, single farm, work community, taskscape, activity

Introduction

Settlements from c. 200 BC–AD 600 in northern Europe are often characterized by farmsteads succeeding one another in the same place over more than one generation (Gerritsen 1999; Myhre 2002; Webley 2008; Holst 2010; Gjerpe 2017; Grønnesby 2019; Løken 2020). Larger settlement sites often consist of several farmsteads, sometimes interpreted as villages. A village on the one hand, and a single farm on the other, could be viewed as opposite points on a continuum, where nucleated settlement and economic interdependence define the "village" end, and dispersed settlement and economic independence form the "single farm" end (Fallgren 1993; Lillehammer 1999; Kaldal Mikkelsen 1999; Myhre 1999; Riddersporre 1999; Øye 2009; Ødegaard and Ystgaard this volume). What constitutes a sense of a common society is in other words not only proximity, but also the presence of a work community, of economic coordination, and of social cohesion and a perception of belonging to a unity (Myhre 2002:135).

Remains of settlements from c. 200 BC–AD 600 are usually preserved under modern-day agricultural land, and thus reduced to the lower parts of earth-dug constructions, such as post holes, cooking pits, fireplaces, ovens, and sunken lanes. This makes it difficult to interpret activities which could indicate coordination between farmsteads in other aspects than in proximity and spatial organization. At Vik in Ørland, central Norway, excavations revealed three neighboring Roman Iron Age farmsteads (fig. 1 and 2). In addition to the features most often preserved, these farmsteads also included waste

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deposits, which contained animal dung, discharge from cooking pits, and household waste, including animal and fish bones (Heen-Pettersen and Lorentzen 2019; Mokkelbost 2019; Storå *et al.* 2019).

In this paper, I aim to analyze whether traces of *activities* in addition to spatial organization can reveal forms of work community and economic and social interaction between the farmsteads. I use the word *farmstead* (Norw. *tun*) in the meaning of the built environment of an agricultural unit, including buildings, cooking pits, ovens, ditches, waste deposits, and sunken lanes. Based on this, I will go on to discuss whether co-operation and coordination of surplus production was initiated from an outside, central farm, or by the inhabitants of the farmsteads.

Analytical framework

I seek to analyze traces of past activities in a dwelling perspective, inspired by the concept of *taskscape* (Ingold 1993; Rajala and Mills 2017). *Taskscape* highlights people's and animals' movement and trajectories in the landscape, and how people, animals, built environment and landscape interact and shape each other's actions. The focus of this analysis will be tasks performed in space and time, or the landscape of everyday and of work (cf. Petersson 2006:11, Frölund this volume). By comparing the remains of the built environment and the contents of the waste deposits in an analysis of activities, I aim to assess the nature of task management within and between the three farmsteads at Vik (cf. Fallgren 1993:73–75).

The taskscape of a farming community is not restricted to the built environment, but includes kitchen gardens, crop cultivation areas, pasture landscapes, hunting and foraging landscapes in the woods and mountains and along the seashore, fishing grounds, as well as pathways and lines of movement within the landscape (Ingold 1993; Fallgren 1993; Petersson 2006:10; Grønnesby 2019). Most tasks include movement within and between different landscapes. For this analysis, mainly traces of tasks carried out within the built environment are available. It is, however, important to consider that most of these activities formed parts of larger tasks, which took place in several different areas within reach of the farmsteads.

Activities are performed in time as well as in space. They are divided throughout a day, a week, a season, and a year. Also, the ways in which activities are performed change over time, and "taskscapes", such as buildings, waste deposits and animal lanes, have biographies (cf. Gerritsen 1999; Webley 2008; Bukkemoen 2015). Here, a biographical perspective will not be at the forefront, because the chronological framework does not allow for detailed studies. However, a coarse framework, discerning main developments and establishing a sense of temporality between the Early Roman Iron Age (c. AD 1–200) and the Late Roman Iron Age (c. AD 200–400), is provided.

Three Roman Iron Age farmsteads

At Vik, Ørland, central Norway, an area of 117,000 m^2 of agricultural land was uncovered in 2015 and 2016, as part of a development-led excavation. Archaeological features were concentrated to seven occupational areas, and dates ranged between c. 800 BC–AD 1250 (Ystgaard, Gran and Fransson 2019). Three farmsteads, named A, C, and D, occupied during the period c. AD 50–400, and placed c. 150–500 meters apart, are the objects of this analysis (fig. 2).

The farmsteads were situated on a dry ridge suitable for crop cultivation, with access to pasture in marshes and beach zones to both sides, and a sheltered harbor at the nearby bay (Norw. *vik* meaning bay). Later, the bay dried out because of isostatic uplift (Romundset and Lakeman 2019). The subsoil alternated between calcareous shell sand and acidic gravel. The shell sand contributed to good preservation conditions for bone material, but poor conditions for preservation of macrofossils and for interpretation of soil chemical samples. Palynological analysis has indicated close interaction between humans, livestock, and vegetation at the farmsteads and in the surrounding area (Overland and Hjelle 2019, Hjelle et al. 2022).

At farmstead A, few buildings were preserved due to modern disturbance. Nevertheless, several waste deposits were preserved, of which two were relatively large. Dates from waste deposit 110297 fell within the range of c. AD 100–250/300, and nearby deposit 106581 c. AD 250–400. An animal lane secured movement between the built environment and pasture. Several cooking pits and hearths were preserved. Dates of cooking pits and hearths range between c. AD 50–575 and concentrate between c. AD 200–500 (Mokkelbost 2019).

Farmstead C contained remains of seven Roman Iron Age buildings, succeeding each other in sequences. In the Early Roman Iron Age (c. AD 1–200), house 4 and house 17 were occupied, preceded, or followed by, house 34 and house 16. Waste deposits 521623 and 524312 were in use concurrently. In the Late Roman Iron Age and Early Migration period (c. AD 200–500), houses 2a and 2b and house 15 were occupied while waste deposit 500200 was in use. Several cooking pits and hearths were preserved (Heen-Pettersen and Lorentzen 2019).

Farmstead D had remains of eight buildings, which succeeded each other in four phases. In the Early Roman Iron Age (c. AD 1–200), houses 21 and 22 constituted the first occupational phase, and houses 26 and 28 the second. In the Late Roman Iron Age (c. AD 200–350), houses 24 and 30 preceded houses 23 and 29. Few and small waste deposits were preserved, due to poorer preservation conditions with acidic, gravelly sand. However, cooking pits and a well or watering-hole were preserved (Heen-Pettersen and Lorentzen 2019).

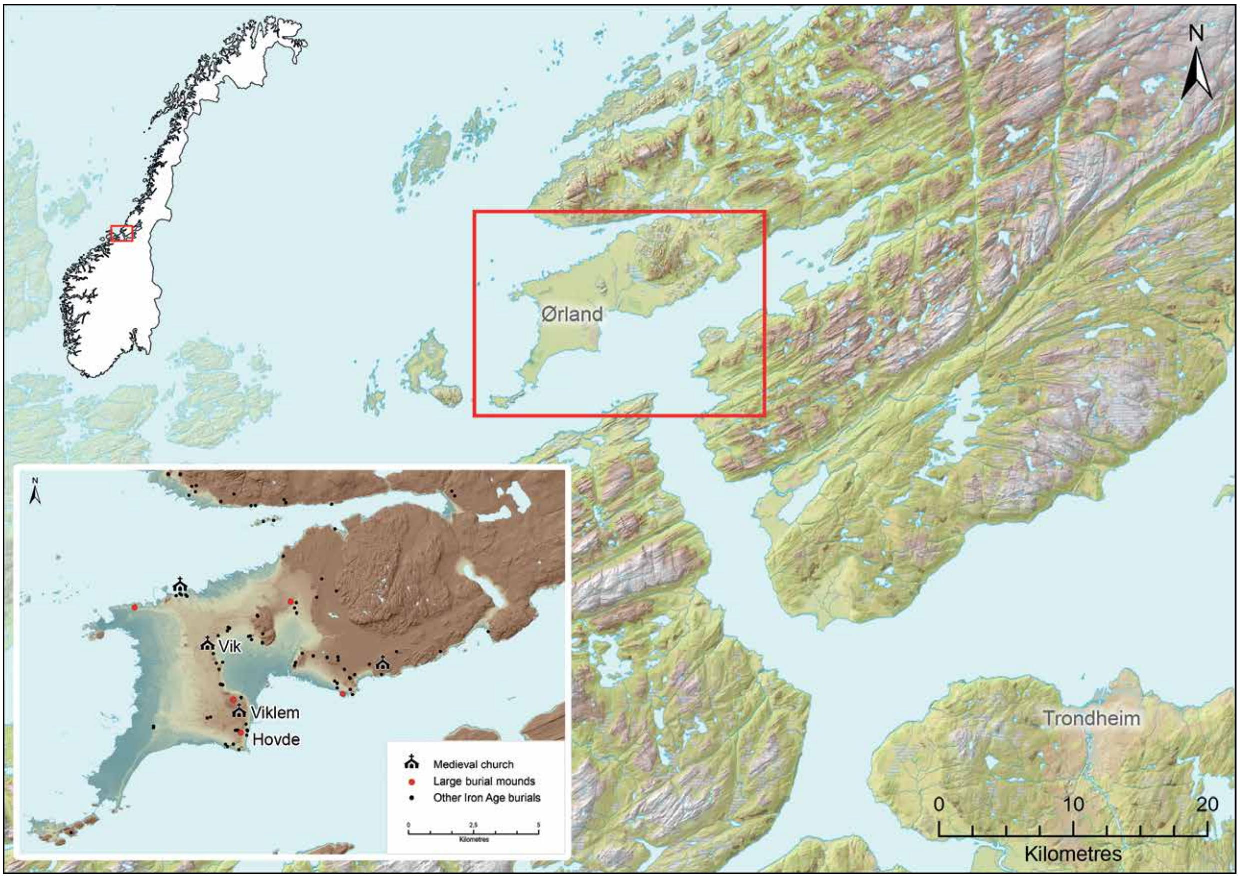

Figure 1. Ørland peninsula, Central Norway. Illustration: Magnar Mojaren Gran, NTNU University Museum.

Activity analysis

Dwelling in buildings: People and animals

Due to preservation issues, farmsteads C and D are the main sources for interpreting activities connected to buildings. Four longhouses, houses 2a, 4, 21 and 28, resembled each other in architecture (fig. 3) (Heen-Pettersen and Lorentzen 2019), and correspond with Løken's type 7 houses from Forsandmoen (Løken 2020:135–146). They were characterized by a central, extended trestle, to either side of which there was an enlarged room, with a fireplace preserved in three of four buildings. A deposit of sherds forming part of a ceramic vessel were found in one of the postholes in the extended trestle in house 21. The presence of a likely ritual deposit can be seen as enhancing the importance of the central room (cf. Løken 2020:142). To the west of the main room, the buildings had wide, but closely placed trestles. To the east, the trestles were comparatively narrow, and placed with larger distances between them. Wall posts (evident in houses 4 and 28) indicate curved walls (Heen-Pettersen and Lorentzen 2019:175). Traces of entrances were not preserved.

Five other longhouses also served as main dwellings, houses 2b, 26, 29, 30 and 34. These buildings do not represent a uniform type. They had 5–8 trestles. Three of the buildings had fireplaces in central rooms. Entrances could not be discerned. They correspond to Løken's type 8, which is a category of houses characterized more by their dissimilarities to other types than by similarities between them (Løken 2020:147). Two of these houses show signs of repair (30 and 34). House 2b should probably be interpreted as a repair or a different phase of house 2a (Heen-Pettersen and Lorentzen 2019:176–177). Storage buildings with three to four trestles accompanied the longhouses: house 16 and 17 in Farmstead C, and house 22 and 23 in Farmstead D (Heen-Petersen and Lorentzen 2019:182–185).

Løken interprets both house types 7 and 8 as combined dwellings and byres (Løken 2020:142, 151). The find distribution in house 2a suggests that the living quarters were in the western part. However, the close distance between trestles in the western part of the other type 7 buildings could indicate that this was the byre (cf. Ethelberg 2020). Soil chemical mapping

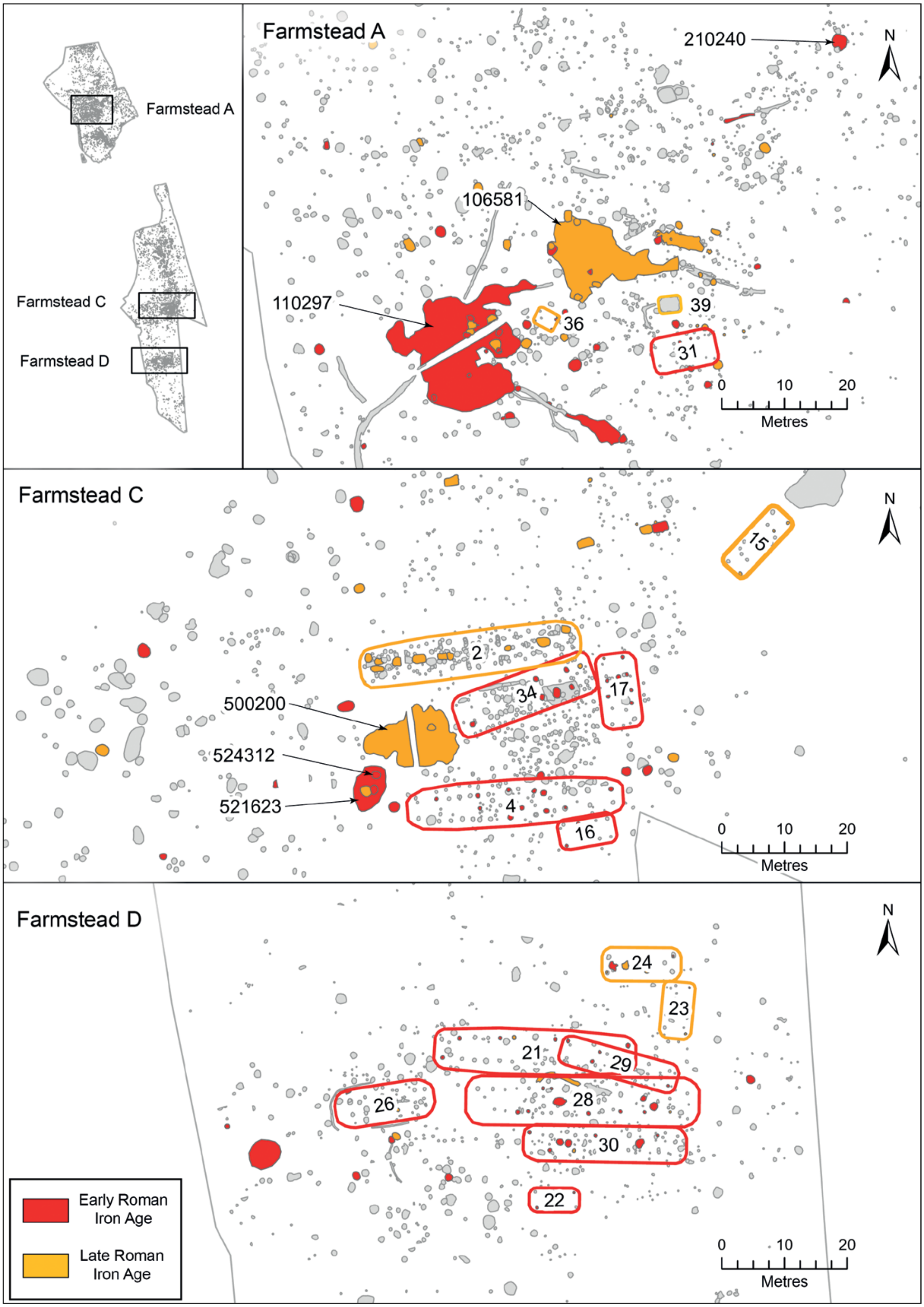

Figure 2. Farmsteads A, C and D, in Vik, Ørland. Illustration: Magnar Mojaren Gran, NTNU University Museum.

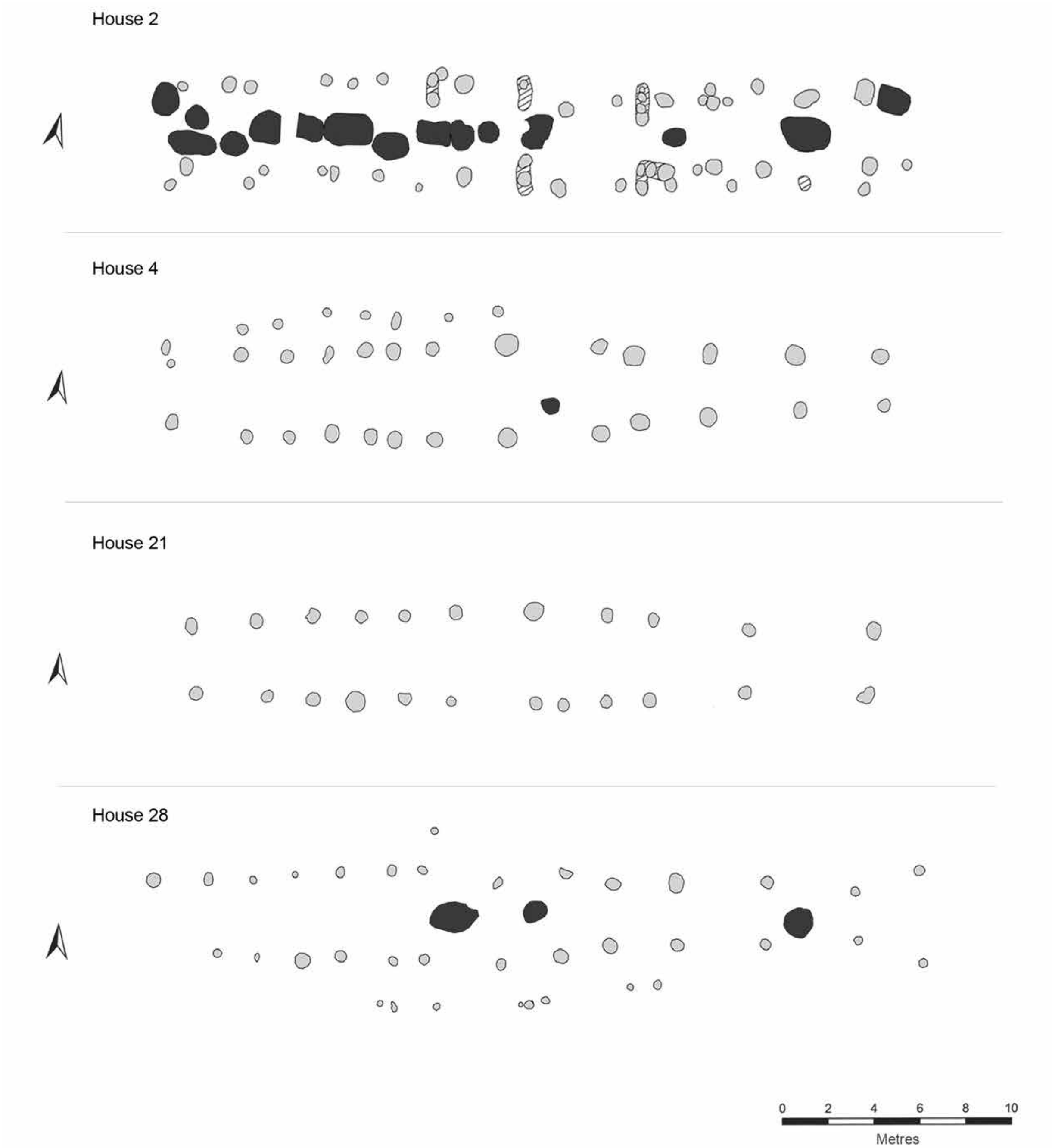

Figure 3. Houses 2a, 4, 21 and 28 at Vik resemble Løken's type 7 from Forsandmoen, Rogaland (Løken 2020). Illustration: Magnar Mojaren Gran, NTNU University Museum.

and preservation of macrofossils did not yield clear indications of the location of the dwelling and byre (Linderholm *et al*. 2019:119). The local climate in Ørland allows animals to stay outdoors for most of, if not the entire, year (Fransson 2019:157). At the same time, byres could have been kept for animals of special value, or for animals with special needs associated with illness, birth, or milking (Myhre 2002:79; Petersson 2006:63–64, 92–93). In farmstead A, animal lanes passed from the built environment through the waste deposits, indicating an association between the deposits and the animals' movements (cf. Myhre 2002:120–121). The presence of dung in the waste deposits in farmsteads A and C, and a water hole for animals close to farmstead D, indicate that each farm had its own livestock, and that at least part of the livestock, at least part of the year, was kept within, or close to, the built environment.

Dung and mixed farming

Micromorphological analysis suggests that dung was left in the waste heaps in farmstead A to ferment (Linderholm *et al*. 2019:130). Micromorphological analysis of soil covered by a Roman Iron Age clearance cairn c. 70 metres northwest of farmstead A showed dung present in agricultural layers (Linderholm *et al*. 2019:127). Even though this could be a result of a rotation system, the collection of dung should be understood as a measure of increasing the yield of the land by fertilizing it.

We do not know where the land route along the ridge passed the farmsteads. If the land route passed on the western side of the buildings, the dung heaps might have been placed facing the road, to be visible. Dung can be regarded a valuable asset, since it both fertilizes the agricultural land, and indicates the size of a herd (Jones 2012:11).

Keeping buildings clean

The waste deposits in farmsteads A and C reflected a mixture of activities: Household waste, containing meal leftovers in the form of animal and fish bones, shells, and cockles. Floor sweepings, containing pottery sherds, organic materials, ashes, clearings from fireplaces and cooking pits, and a relatively high number of personal items such as glass beads, a needle, bone hairpins, and knives (Mokkelbost 2019:204). Human waste and animal dung were also part of the mixture. Discarded materials and radiocarbon dates show close connection between activities in the buildings and the waste deposits. In deposit 500200 in farmstead C, a heap of burnt stones closely resembled the stones in fireplace 512212 in house 2, illustrating how the daily task of maintenance of the fireplace involved movement between the longhouse and the waste deposits.

Crop cultivating and processing

Even though macrofossils were generally poorly preserved, some cereals were preserved in the waste deposits and post holes in all three farmsteads, including barley, hulled barley, and oats. Weeds were well represented, and included fat-hen, pale persicaria, corn spurrey, black-bindweed, common chickweed, sedge, common knotgrass, sheep sorrel, and goosegrass. In farmstead C, a hazelnut was found, and in farmstead D, a pea (Linderholm *et al*. 2019). In farmstead A, the upper part of a rotary quern was found in a disturbed context, but most likely stemming from the Roman Iron Age farmstead. In farmstead C, an underlier of a push grinder was found (Mokkelbost and Fransson 2018:165–166; Heen-Petersen 2018:510). Crop cultivating, and processing of crops and weeds into fodder, porridge, bread and possibly beer, must therefore have been part of the year-round and daily activities in all the three farmsteads.

Meat, dairy, wool, and hide

The waste deposits, as well as some post holes, hearths, and pits, contained large quantities (c. 25,4 kg) of mostly unburnt animal bones and fish bones. The mammal fauna was dominated by domestic species. Cattle were most numerous, followed by sheep and goats and, less frequently, pigs. Horses and dogs were also present. Age analyses of domestic animals reveal that more cattle were slaughtered as adult animals in farmstead A than in farmstead C (fig. 4). This implies that cattle were kept for dairying to a larger degree in farmstead A, and for meat to a larger degree in farmstead C. The rib cases of the animals with vertebral and rib fragments were frequently missing in both farmsteads. It seems that these meat-rich parts of the animals were not consumed in farmsteads A and C but taken elsewhere (Storå *et al*. 2019:239–241).

When it comes to sheep and goats, the Early Roman Iron Age waste deposit 110297 shows a different pattern than the Late Roman Iron Age deposit 106581, both in farmstead A. There is a higher frequency of older animals, indicating wool production in the earlier deposit, shifting towards a higher emphasis on younger animals and meat production in the later deposit. In farmstead C, the kill-off pattern of sheep/goats shows that older animals were kept, and this indicates an emphasis on wool production (Storå *et al*. 2019:242).

The peripheral parts of both cattle and sheep/goats, often characterized as slaughter waste, were largely missing, both in farmsteads A and C. Peripheral parts may have been left on the hides of the animals in the process of slaughter. This indicates either that the slaughtering took place outside of the built environment of the farmsteads, or that slaughter did take place there but that the hides were transported elsewhere for further preparation (Storå *et al*. 2019:241).

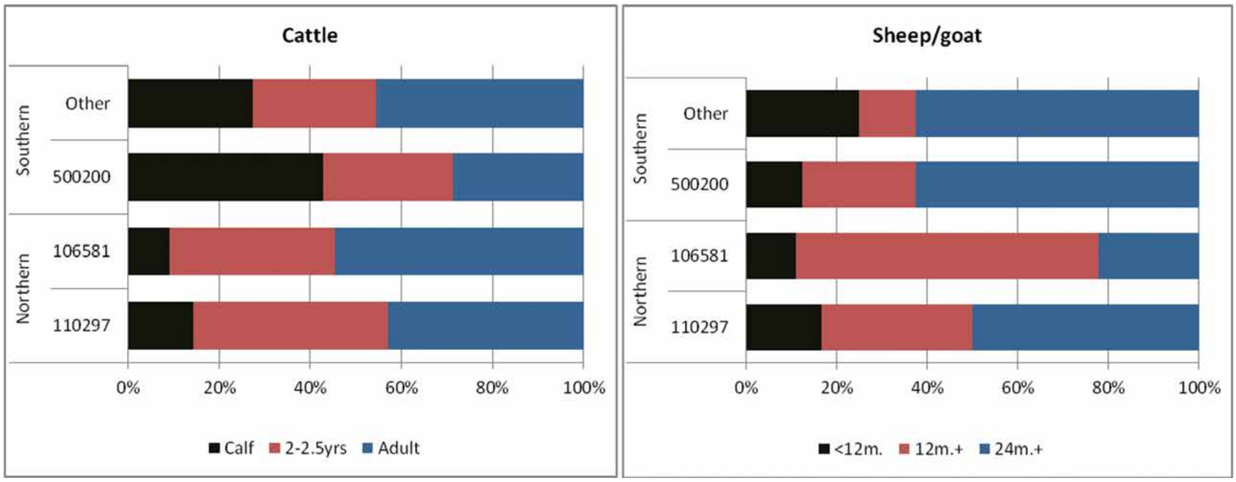

Figure 4. Age distribution for cattle (left) and sheep/goats (right) in the northern area (farmstead A) and southern area (farmstead C). Illustration: Jan Storå, University of Stockholm.

Fishing, foraging, and hunting

Fish bones made up a substantial proportion of the bones retrieved from the waste deposits, with a slightly higher frequency of fish bones in farmstead A than in farmstead C. The most frequent species were Atlantic cod, saithe, haddock, and common ling. The frequency of herring bones was low, possibly because these delicate bones are less well preserved. No salmon was represented. All the species represented occur in the waters around Ørland. The size and body parts of the Atlantic cod do not indicate imports or fish trade (Storå *et al*. 2019:243–245). Fishhooks were found in both farmsteads A and C (Mokkelbost 2019).

A wide variety of wild game was represented, although the total number of each species was low. Species included harbor seal, harp seal, grey seal, whale, otter, deer, brown bear, and a variety of birds, including auk, sea gull and possibly falcon (Storå *et al*. 2019:239–240). Thus, people from the Vik farmsteads hunted both land and sea mammals as well as birds, although wild game did not constitute a central part of the food consumed at the farms.

Shells, mainly cockles, but also some oyster shells, were represented in both farmsteads. Waste deposit 210240 in farmstead A contained large quantities of cockles foraged from the nearby shores, which seem to have been devoured in large numbers during a short feast (Mokkelbost 2019:207).

Cooking and feasting

Indoor food preparation is evident through hearths, grinding stones and pottery remains. Hearths are central in longhouses, and many of the daily activities were concentrated around them (Webley 2008; Bukkemoen 2016:119). Several houses in the Vik farmsteads had hearths preserved, but the numerous hearths and cooking-pits in house 2a stand out, indicating that farmstead C had a particular role in food preparation and feasting towards the end of the Late Roman Iron Age and in the Migration period (Heen-Pettersen and Lorentzen 2019). One of these hearths (512212) was especially carefully constructed, with a larger part, probably for heat, and a smaller ring of stones which could potentially function as a pot-stand near the heat (fig. 5). Grinding stones indicate flour grinding for porridge or bread (above).

Pottery was found in the waste deposits, placed deposits, postholes, hearths, and cooking pits, and included coarse ware and fine table ware from the Early Roman Iron Age, and bucket-shaped pottery from the Late Roman Iron Age and Migration period. The fine pottery, as well as sherds of a glass beaker, indicate that feasting included a significant element of display and ceremony. Analyses of 16 potsherds show that seven vessels contained lipids from a variety of sources, including aquatic animals, ruminants, and vegetable fats (Solvold 2019:290). Vegetables were generally consumed in an everyday setting, while meat was reserved for special occasions (Isaksson 2003; Bukkemoen 2016:127).

Cooking pits were found in large numbers within and surrounding the farmsteads. Cooking pits are known to have had diverse functions, but they are often interpreted as results of cooking events, associated with commensality (Bukkemoen 2016:118; Meling this volume). Selected cooking pits were excavated and dated. As a tendency, in the Pre-Roman Iron Age, cooking pits were placed at the outskirts of the built environment. In the Early Roman Iron Age, cooking pits were placed closer to the built environment, and sometimes between contemporary buildings, while in the Late Roman Iron Age and on the transition to the Migration period, cooking pits were even placed indoors (Heen-Pettersen and Lorentzen 2019:186).

Figure 5. Hearth 512212 in house 2a. Photo: NTNU University Museum.

Representation: Hall rooms and separate hall buildings

The four type 7 houses all had central, enlarged rooms marked by extended trestles (fig. 3). Fireplaces and a door-stone in house 2a, macrofossils in house 4, and a placed deposit in house 21, further enhance these as rooms of special importance. Houses 4, 21 and 28 all belong to the earlier phases of the farmsteads, signaling that a hall-room within the longhouse was the main room of assembly in that period (cf. Løken 2001:71–76; Ødegaard *et al.* this volume).

Houses 24 in farmstead D and 15 in farmstead C house were occupied in the later phases of each farmstead. House 24 had deep and wide post holes compared to the other buildings at the site, and seemed to have been especially well built. Pottery from house 24 consisted of finer table ware. House 24 could have functioned as a separate hall building, erected in the later phases of the farmstead (Heen-Pettersen and Lorentzen 2019:185). House 15 in farmstead C was possibly contemporary with house 2b. It was placed at a small distance from house 2b, and could be interpreted as a separate hall building, in a similar fashion to house 24 (Ystgaard 2019:388; cf. Løken 2001; Herschend 2009:253).

Other rituals

Stages in the life cycles of Roman Iron Age buildings were often commemorated (Carlie 2004; Herschend 2009:156–160; Sofield 2015; Løken 2020:142). Ceramic vessels were deposited in postholes of houses 21 and 34, possibly when the buildings were left. Buildings were most likely cleaned, and artefacts removed, before they were taken down or left. House 2 differs from this pattern. Here, remains of hearths, pottery and household waste are abundant. A piglet was ritually deposited during the last phase of use of house 2, and a foal at the time when the building was left (Heen-Pettersen and Lorentzen 2019:186–188; Storå *et al.* 2019:246).

The large waste deposits in farmsteads A and C were both moved around AD 200, possibly in connection with the erection of new longhouses and re-arrangement of the farmsteads. The older waste deposits were sealed with a layer of sand and clay, possibly as part of a closing ritual connected to the re-arrangement (Mokkelbost 2019:205–206). Finds from the waste deposits also included personal items, such as a bone comb, a bone hairpin, a bone arrowhead, a bone spoon, an iron knife, an iron key, iron fishhooks, an iron belt buckle, an iron needle, glass beads, glass fragments, whetstones, and silver and bronze finger rings, which can perhaps all be interpreted as lost items. However, in many aspects they resemble personal items normally found in graves. A possible interpretation is that they were ritually deposited in the waste deposits (Mokkelbost 2019:228; Borøchstein 2021:61).

Discussion

Work community, social cohesion, and sense of unity

Based on calculations in Løken (2020:258), each type 7 house could potentially accommodate 12–14 people, while type 8 housed a few less, possibly 8–10. Both house types could thus accommodate more than one generation, or a superior family and a family of dependents (Skare 1999:74-77; Myhre 2002:123; Løken 2020:257). By this reckoning, each farmstead accommodated enough people to perform the tasks and activities required to maintain self-subsistence.

Each farmstead in Vik possessed a herd of cattle, sheep/goats, a few pigs, and a dog. According to Løken's calculations, the type 7 buildings could have housed up till 14 animals. This is suggested to be the average number of animals stalled in Roman Iron Age farms (Myhre 2002:145; Løken 2020:138). Although the Vik longhouses did not yield decisive evidence of indoor stalling, the activity analysis show that animals were kept close to the built environment. They were a natural focus of the day-to-day tasks and year-round activities of each farmstead. This corresponds well with the notion that animal husbandry, and especially cattle husbandry, was at the core of the Early Iron Age value system (Myhre 2002:145–146; Grønnesby 2019:78).

Fertilizers were collected and stored in each farmstead and were not regarded a common resource. This indicates that there existed plots of land for which the fertilizers were intended. In Roman Iron Age western Norway, fertilizing farmed land increased in importance, reflecting the situation in Vik (Myhre 2002:139–141).

Diinhoff (2011:220) points out that Roman Iron Age farmsteads in Western Norway were of impressive, but comparable, sizes, and that most should be perceived as socially equal. This is of significance for the interpretation of the Vik farmsteads, which are also large and of comparable sizes (Heen-Pettersen and Lorentzen 2019:188). Central hall rooms followed in time by separate hall buildings do not necessarily signal a significantly high status, nor an increasing status. Instead, the Vik material leaves an impression that a farmstead of an average standard was *expected* to keep a hall room and later a separate hall building, and that these halls were primarily used for commensality and rituals for people belonging to the farmstead, and not for a larger community (cf. Løken 2001).

Ritual meals and commensality were part of the year-round activities of each farmstead. The increasingly close connection between cooking pits and the built environment can be interpreted as part of a movement of practice from an open-air commensality of the Early Iron Age to the greater exclusivity of indoor cooking and beer brewing of the Late Iron Age (Bukkemoen 2016:127; Grønnesby 2016; Bukkemoen 2021). Moreover, rituals were performed according to transformations and negotiations of new situations in each of the three farmsteads. Carlie (2004:213) relates deposits connected to inauguration and closure of buildings to an ancestral cult, which corresponds well with an interpretation of the farmsteads as independent units centered on family relations.

The Roman Iron Age farmsteads in Vik therefore seem to have been independent of each other both in social, economic, and ritual terms. They were characterized by uniformity and independence, rather than internal hierarchy and dependence (cf. Holst 2014:184). At the same time, activities performed beyond the built environment have great potential for co-operation, such as animal herding, hunting, foraging, and fishing (Fallgren 1993; Kaldal Mikkelsen 1999; Øye 2009). The uniformity in tasks and activities, as well as in spatial organization and re-organization, reflects common notions of how tasks, activities and space should be arranged. The inhabitants seem to have been mirroring each other's practices throughout the life span of each farmstead, reflecting a high degree of social cohesion.

Even though the main impression of the task organization within the built environment is independence rather than interdependence, analysis of animal bones from waste deposits in Vik indicates that there was different emphasis on different products between the farmsteads. Farmstead A emphasized wool production in the Early Roman Iron Age, while in farmstead C, wool production was important throughout the Roman Iron Age. Examples from Denmark, the Netherlands and from Eketorp in Öland indicate that increasing wool production reflected an increasing demand of wool from the Early Iron Age (Pedersen and Widgren 1998:368–369). Missing extremities might imply that raw hides with extremities still attached were transported out of both farmsteads A and C for further preparation elsewhere. Surplus production and specialization requires a certain level of coordination and co-operation between the farmsteads (Frölund 2019:148). A relevant question, therefore, is how such coordination was organized.

Surplus production and community organization

Surplus production and specialization are regarded as prerequisites to the development of settlement hierarchies, and to a general hierarchization of Scandinavian Iron Age society. Organization and trade of surplus products is often tied to central or magnate farms (Pedersen and Widgren 1998:312; Myhre 2002:165; Frölund 2019:26–29, 45). A centralized mode of organizing surplus production has been regarded as essential for early trade networks. Surplus production further enables farming societies to sustain the training and mobilizing of specialists and has been regarded as essential to the recruitment of warriors and maintenance of war-bands (Myhre 2002:161–165; Holst 2014; Ystgaard 2020). Surplus production can also be understood in relation to the rise in the exploitation of outfield resources, including iron production (Rundberget 2010).

The increasing corpus of empirical evidence and interpretations suggest that a range of different modes of dependency between economic units existed in Norway and Scandinavia during the Roman Iron Age. Skre argues that magnate farm structures, with dominant farm units inhabited by landowners, and dependent farm units inhabited by tenants, can be traced from the Roman Iron Age in parts of eastern Norway (Skre 1998:249–250). His analysis is based on grave finds, and organization of surplus production is not part of his discussion. Herschend, who bases his analysis on settlement evidence, maintains that surplus production of hides and wool in Öland could be managed by each farmstead, but that larger landowners served central roles in storage, transportation, and trade (Herschend 2009:322–325). Frölund recently examined specialized production in two farmsteads close to Old Uppsala. Although dating from the Roman Iron Age and thus being older than the establishment of Old Uppsala, specialized production of meat and tar in the farmstead Berget is interpreted as surplus produced as part of a tributary system (Frölund 2019:149–150; Frölund this volume). Other studies suggest that surplus-producing farms were coordinating the production between themselves, in a cooperative manner, also termed a peasant mode of organization (Myhre 2002:135; Wickham 2005; Holst 2010; 2014:180, 184). In the Jutland material, Holst emphasizes an overall tendency to farmstead autonomy, role parallelism and equality (Holst 2010; 2014:181, 184–185). Against this background, I will now discuss the organization of activities in Vik and Ørland.

The case of Roman Iron Age Ørland

An assessment of the relations between the Vik farms could point out a "first among equals" – a farmstead from which the initiative and direction of cooperation might have come. Farmstead C reflects a slightly more sophisticated agricultural production than farmstead A, and had a longer occupational phase than farmstead D. After farmstead D had ceased to function, farmstead C flourished, with the extravagant house 2, imported glass, fine tableware, and sophisticated ritual practices (Heen-Pettersen and Lorentzen 2019; Mokkelbost 2019; Solvold 2019; Storå *et al.* 2019).

Archaeological evidence from the Ørland peninsula suggests that the Vik farmsteads formed part of a larger community consisting of largely independent farmsteads which, however, closely resembled each other. A Pre-Roman Iron Age / Roman Iron Age farmstead with a comparable lay-out and situation in the landscape to the farmsteads at Vik has been excavated at Hovde (Grønnesby 1999; fig. 1). A village-like cooperation and coordination of tasks between the Vik farms would thus have formed part of a larger community.

In this setting, we need to address the possibility of a centrally organized surplus production in Ørland. At Viklem, a kilometer and a half to the south of Vik, settlement traces from the Pre-Roman Iron Age, Roman Iron Age, Migration period, and Viking Age / Early Medieval period farmstead have been excavated. They are located next to an undated burial mound, which measures more than 30 meters in diameter, and a medieval church, mentioned in written documents in 1342 (Brendalsmo 2006; Berglund and Solem 2017; Ellingsen and Sauvage 2019). However, excavations at Viklem do not render a complete image of the Roman Iron Age settlement, and it remains to verify Viklem as a Roman Iron Age central farm.

A diversity of practices and organizational principles must be expected in Iron Age societies (Holst 2014:179). As Holst points out, a warrior-aristocratic mode of organization, and a village or peasant mode of organization, most likely co-existed (Holst 2014:188). Susan Oosthuizen discusses how members of a farming community can be engaged in the organization of communal rights, such as grazing in commons. Organization of communal rights is characterized by Oosthuizen as a form of collective, "horizontal" governance, as opposed to centrally initiated, hierarchical and "vertical" governance (Oosthuizen 2016). In the Vik case, a communal organization between the farmsteads regarding resources such as grazing, fishing, foraging, and hunting rights must be expected. This could have paved the way for co-ordination of surplus production between the farms.

Conclusion

Activity analyses of Roman Iron Age farmsteads contribute to the understanding of economic and social organization, and of dependency. The activities performed in farmsteads are of equal importance to the understanding of their relations and organization than the more often studied spatial organization.

The activity analysis of Vik indicates that the three farmsteads were independent units, each providing its own subsistence and caring for its own inhabitants, livestock, cultivation areas, food preparation, feasts, and rituals. At the same time, the farmsteads were mirroring each other in activities and spatial layout. Pasture, fishing grounds, and foraging and hunting areas, were common resources. Also, surplus production was divided and coordinated between the farmsteads.

The division and coordination of tasks in surplus production could have been initiated from outside, for instance from a central farm, possibly situated at nearby Viklem. However, there is not sufficient archaeological evidence to satisfactorily support this hypothesis. A more likely interpretation is that the farms organized their co-existence and cooperation between themselves, perhaps initiated from farmstead C, which – of the three farmsteads – can be viewed as a first-among equals.

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Old Uppsala, Eastern Sweden: Framing an Iron Age tributary society

Per Frölund

Abstract

The power of Scandinavian Iron Age society was based on control over people and personal relationships. An emerging aristocracy from c. AD 200 demanded tributes from both free and unfree peasants. This tributary system was based on various population groups who were linked by mutual obligations and services. In this context the interregional central places were bases for economic, political and religious control over large areas. Among these central places was Old Uppsala in eastern Sweden. There must have been an economy in the form of agricultural production from settlements that maintained these places. The economy and social structure at two large settlements showed similarities and differences in agricultural production in the period 200 BC–AD 600. The differences are expressed by an anatomical underrepresentation among cattle and a deficit in the mortality profile of lamb at one of the settlements. There was also a specialized production of non-agricultural products at the same settlement. These settlements must have played an important role in Old Uppsala's tributary system. The differences indicate that the settlements had different access and rights to land and economic resources. The study shows that seemingly similar settlements can harbour major economic and social differences.

Keywords: Agricultural production, aristocracy, central place, Old Uppsala, surplus production, tributary system

Introduction

Around AD 400 Old Uppsala in Eastern Sweden, emerged as a high-status residence with a magnate farm. This paper discusses the agrarian economy in the Old Uppsala area 200 BC–AD 650 (Frölund 2019). The ability to generate an agrarian surplus is one of the most important prerequisites for high-status residences, not least through the development of non-agrarian social groups. But how was the agrarian economy formed, what were its characteristics, what changes can be seen over time, and can the influence of the central place be seen?

Old Uppsala as a research subject

Since the 17th century, Old Uppsala has been the subject of intensive research and a sometimes-heated scientific debate (Duczko 1997, 1998; Sundqvist and Vikstrand 2013). The comprehensive research has been strongly influenced by older literary sources such as Adam of Bremen's *Gesta Hammaburgensis* (Alkarp 2009). This influence is particularly noticeable in the many attempts to link people, events, and places in the literary sources to certain sites in Old Uppsala (Lindqvist 1936; Duczko 1997; Ljungkvist 2006; Alkarp 2009; Ljungkvist *et al* 2011; Ljungkvist and Frölund 2015; Gräslund 2018; Skre 2020).

Old Uppsala was the centre of the early medieval group of royal estates and manors known as *Uppsala öd.* It was the site of the original *Disting.* It was the royal seat of many Ynglinga kings, it is considered the pre-Christian cult centre of the *Svear* and is Sweden's first archbishopric seat (Sundqvist 2002; Ljungkvist 2013; Sundqvist and Vikstrand 2014; Ljungkvist and Frölund 2015). This focus of research changed in the 1980s when Old Uppsala began to be studied as an example of a Scandinavian interregional central place (Fabech 1999; Näsman 1991, 2010).

The agrarian economy of Iron age settlements

In the following, some concepts important for the analysis of the agrarian economy are discussed.

Central places and agrarian settlements

Central places functioned as bases for the elite to exercise economic, political and religious control over vast areas. The ability to acquire an agrarian surplus is one of the most important prerequisites for Scandinavian central places and high-status residences, not least for the development of non-agrarian social groups such as craftsmen, warriors, and religious experts (Christensen 2010; Skre 2011, see Hjulström and Lindeberg this volume). Access to agricultural products and raw materials would have been of fundamental importance for supporting the direct supply, and also for ensuring the specific functions of the central places. The main agricultural products would have been produced locally by the contemporary settlements for logistical reasons.

There are few in-depth studies of the extent and spatial structure of central sites (Loveluck 2005; Christensen 2010). According to Näsman (1998), these high-status places were primarily central to the surrounding area. Jørgensen (2011) has emphasized a model consisting of an aristocratic residence with associated farms of craftsmen and agricultural producers. Callmer (2001) argued that central places had a bipartite structure in the form of centres and domains. Herschend (2009) and Holst (2014) have emphasized the connection between the warrior aristocracy and large settlement complexes with centralized functions.

The agrarian settlements would have played a crucial role in the formation and maintenance of central places. To understand and evaluate the significance of these settlements, their economic and social structure must be analysed in relation to central places (Loveluck 2005). To analyse the agrarian economy behind Old Uppsala magnate farm can provide new insights into an Iron Age tributary system.

Scandinavian Iron Age society

Scandinavian Iron Age society was generally regarded as egalitarian until the late 1980s, when there was a reassessment of pre-state societies, above all of the supposedly equal nature of society and of kinship as the only social category. This altered view of Iron Age society, in comparison with the former one, has a greater focus on social relations and comparisons with European contexts. According to, amongst others, Skre (1998), the former view had serious empirical and ideological difficulties, especially regarding the perception of the Germanic societies as a common cultural area and the perception of kinship as the only basic social category. Since the late 1980s, Iron Age society has been viewed as strongly hierarchical and stratified (Skre 1998; Iversen 2009; Zachrisson 2011). Exercise of power relied on the control of people and on personal relationships, as outlined by Steuer (1989) in the P*ersonenverbandstaat* model, in contrast to a feudal society where control of land and land ownership formed the basis of the exercise of power (Widgren 1998; Ethelberg 2003; Wickham 2005; Fallgren 2006; Thomas 2011; Lindkvist 2014).

This hierarchical structure has been categorized as a society consisting of various social groups: unfree at the base, a wide collection of peasants, specialists, and aristocracy in the middle and kings at the top. These social categories were related through a system of mutual obligations and services (Thomas 2011). As early as the 2nd century AD, the Scandinavian elite is thought to have taken control of trade, crafts and cult practices (Fabech 1991, 1994; Herschend 1993, 1997; Hedeager 1996; Jørgensen 2002, 2009; Dobat 2010). Land ownership and limited rights to land are thought to have developed by the middle of the first millennium, (Herschend 2009; Zachrisson 2017). Several scholars have also characterized this form of society as a tributary society, where a gradually emerging aristocracy with large farms has been able to, recurrently, cyclically and temporarily, demand labour and tributes from more or less independent farmers (Wickham 2005; Lindkvist 2014). These tributes were a prerequisite for the exercise of power, but depended on personal relationships arranged in what has been described as a patron-client relationship (Wickham 2005; Nicolay 2010).

Tribute – tax – gift

Wickham (2005) states that the concept of tribute usually refers to temporary payments in the form of coins, precious metals or payment in kind. Tributes can be (but do not have to be) irregular and arbitrary, and consist of lump sums from societies, communities or individuals as opposed to land taxes that require documentation systems in which landowner information, the amount claimed, and the amount actually paid are recorded. Thus, tributes are regarded as a central institution in stratified societies, but what does it mean? According to Poulsen (2011) it is difficult to determine when a payment is a gift, a tax, or a tribute.

Tributes occur at various societal levels but are usually defined as given from or to a chief or king, or as a payment or fee from one prince or state to another, as an acknowledgement or confirmation of submission and the price for peace, security and protection. *Danagäld* is an example of this kind of tribute known before the year 1000 (Poulsen 2012). Other obligations took the form of annual tributes of cattle such as the Frankish *Haribannus* and the *Osterstofa* (Wickham 1984). Their origins are unknown, but during the 8th century these fees were paid by farmers from larger areas in lieu of military service (Wickham 1984, 2005).

The concept of tribute also includes obligations paid by farmers to a chieftain or king for protection or recognition of supremacy (Vogt 2017). Another form of tribute is represented by the Norwegian *veitsla* (Bjørkvik 1975), earliest known in the form of special sacrificial meals symbolizing a mutual relationship between peasants and a chieftain (Gurevich 1978). The peasants were responsible for the content of the meal, but the meal was taken jointly by the chieftain, his men and the peasants. According to Gurevich (1978) the *veitsla* was one of society's most important institutions. From Anglo-Saxon England, a similar form of tribute is known as *feorm* (Wickham 2005; Faith 2009). In its earliest known sense, *feorm* was a socially recognized obligation for residents of an area to transfer part of their agrarian surplus in the form of meals for the chieftain and his retinue. Often, *feorm* was calculated in terms of products for individual meals such as bread, meat, beer and so on. Both *feorm* and *veitsla* can be seen as a part of the social custom of ceremonial gift giving or gift exchange (Malinowski 1922; Mauss 1972; Sahlins 1976; Godelier 1999). Ceremonial gift-exchange includes, among other things, the exchange of valuable objects or creatures and feasts, expressing strong, reciprocal ties between donors and recipients (Hénaff 2013).

As stated above, it can be difficult to understand the difference between when a payment was a gift, a tax or tribute. But in the Ynglinga saga (Sturlasson 1991, chapters 26–27) a distinction between gift and tax appears. The Ynglinga saga illustrates, in the framework of friendship between two kings, a form of reciprocity where compensation for services rendered in the form of gifts is associated with friendship, as opposed to taxes which do not appear to relate to friendship. Another important example concerns Old Uppsala and originates with Adam of Bremen. The gifts to the temple during the major calendrical feasts were mandatory and even if you yourself refrained from traveling to Old Uppsala, you still had to send the gifts. No one was granted exemption from these feasts (Sundqvist 2016).

Jørgensen (2001, 2002, 2009, 2010) has discussed thoroughly how a tributary system may have operated, based on the aristocratic centres with magnate farms in Gudme, Lejre and Tissø. He concludes that the system was a prerequisite for the establishment of large farms during the Iron Age based on direct operation and on subordinate farms. The intention was clearly to impose fees and services on the population (Jørgensen 1996). The magnate farms were collecting and circulating larger quantities of resources than ordinary settlements from the 3rd century onwards. At the magnate farms there was a larger consumption of prestige objects. The special conditions at the magnate farms would have resulted in a different assemblage of archaeological finds, depending on how the resources were provided. Jørgensen (2010) identifies three main systems for the acquisition of extensive resources, but emphasizes that these systems can overlap, and that the tributary system also can apply to direct operation of larger land areas. The various acquisition systems reflect a roughly linear development during the period discussed (Jørgensen 1996).

Settlement pattern

Settlement patterns are here used as an archaeological concept that describes, on a general level, how different cultural activities spread over a certain area over different periods of time. In this context, it also refers to the way houses, fences, fields and activities are distributed in a settlement. The shape of a settlement is often, directly or indirectly, influenced by the surrounding landscape. Chronological tendencies can be recognized in the morphology and internal anatomy of settlements (Thomas 2011, see Lindell this volume, Ystgaard this volume).

Agrarian surplus production

In archaeology, evidence of a surplus production is interpreted as a sign of a stronger political organization, more hierarchical decision-making or increased differentiated power (Hastorf and Foxhall 2017). For a stratified society surplus production of basic foods is one of the cornerstones (Bakels 1996). In order to develop non-agricultural social groups in a society, agrarian surplus production is required over a long period of time (Mazoyer and Roudart 2006). The intensification of agriculture, in particular, has been identified by research as a key to the rise of complex societies (Christensen 2010; Morrison 2015).

But what is the difference between subsistence production and surplus production? Subsistence production is usually explained as a type of production where the purpose is to provide the farmer's family or household with food, water, and other supplies. Surplus production means there is an increase in production beyond what is necessary to support farmers and their families (Bakels 1996; Mazoyer and Roudart 2006). Studies concerning Swedish conditions have shown that during the period AD 1–400 there was surplus production based on animal husbandry and arable farming, with the surplus intended to be used as barter in markets controlled by the elite (Pedersen and Widgren 1998; Widgren 1998).

Surplus production of basic foods requires an increase in production. Production increases are usually made through expansion or rationalization. Expansion can occur through extensification or intensification (Hingh 2000; Groot and Lentjes 2013). Extensification can be an increase in the total land area or in the number of cattle (van der Veen 2005). Intensification can be an increase in the productivity of a particular piece of land through the addition of energy and increased resources in the form of labour or capital (Morrison 1994). Raising larger animals or slaughtering the animals at the most favourable age are examples of intensification of livestock management (Groot and Lentjes 2013). Other examples are the Early Iron Age agrarian technology complex (Myrdal 1984), where the most important features are iron tools and storage facilities, and cultivation of new crops (Hingh 2000).

Rationalization is a change that provides more efficient production, for example by organizing arable land in plots (Groot and Lentjes 2013). Relative specialization, i.e., the production of a special crop outside normal production, can also be seen as a measure promoting rationalization (Bakels 1996; Groot and Lentjes 2013).

Several researchers believe that when organic material from a settlement is dominated by a single specie this may indicate a local specialization and therefore point to a surplus production (Bakels 1996; Kooistra 1996; Crabtree 2010). In a subsistence economy, an even distribution of the slaughter age of the animals is the expected outcome (Vretemark 1997). Variations or changes in the slaughter age consequently reflect changed animal husbandry strategies, since the slaughter age of the animals is governed by how they were used and what products were produced (Groot 2008). Osteological analyses can thus show clear signs of specialization linked to surplus production, especially when young bovine animals can be classified as underrepresented (Kooistra 1996; Nagels 2012, see Ystgaard this volume).

When imported goods, i.e., not locally produced, in the form of objects begin to appear in an agrarian settlement, this can indicate a balanced surplus production, based on the general premise that a commodity can only have been bought if something else has been sold. From agricultural settlements, agricultural products are the potential commodity (Kooistra 1996). An example could be the presence of saltwater fish on an inland settlement. In addition to the organic remains, another important key to understanding agrarian production can be found in the structure of the settlement. Alterations in the existing buildings can be perceived as a response to changes in the economy and production of the settlement (Bakels 1996; Kooistra 1996; Groot and Lentjes 2013). For example, if the living space is enlarged this can be explained by a population increase and perhaps a change in the composition of the household. In the same way the storage capacity of a farm can be causally related to the residents' needs and their requirements for storage space. If more cattle or crops are produced than before, this should also be reflected in storage capacity. When storage capacity is calculated to exceed the actual needs of the farm, it might be an indication of a local surplus production.

Two Iron Age villages

Barely 1 kilometer to the east of Old Uppsala, two large settlements have been excavated, Berget and Bredåker (fig. 1). The settlements were located on either side of a narrow river valley in the Uppsala plain, a large fertile area around Uppsala.

Large-scale excavations have been conducted in Old Uppsala and its immediate surroundings over the past 20 years, particularly of Iron Age agrarian settlements (Häringe Frisberg and Göthberg 1998; Fagerlund 2003; Häringe Frisberg *et al* 2007; Göthberg 2007; Hjärthner-Holdar *et al* 2007; Göthberg *et al* 2014; Beronius Jörpeland *et al* 2017; Frölund 2019). Old Uppsala has been the subject of an archaeological research project *Gamla Uppsala - the emergence of a mythical centre* (Ljungkvist *et al* 2011; Ljungkvist and Frölund 2015). Abundant scientific discussion and the many comprehensive archaeological investigations have given Old Uppsala a particularly important place in the study of how agrarian settlements change under the influence of a high-status environment (Zachrisson 2011, 2013).

Berget

The farm Berget was moved from Old Uppsala village through a land consolidation in the 1850s. Archaeological excavations have been conducted between 1997 and 2016 (Frölund 2019). 70% of a nearly 70,000 m^2 settlement has been excavated. Ninety houses and a large number of fences and other features dated from 200 BC to AD 650 were excavated (fig. 2). The settlement was in historically arable land, near a large meadow next to a smaller stream, with obvious resources for grazing, cultivation, water and animal fodder.

From the onset, the settlement was divided into farms, which is clear from the fences that existed from the beginning. The settlement organization is characterized by a large degree of stability, with many overlapping features and houses. At the end of the period AD 1–200 there were nine farms, dropping to seven farms early in the period AD 400–650. Some of the farms were short-lived.

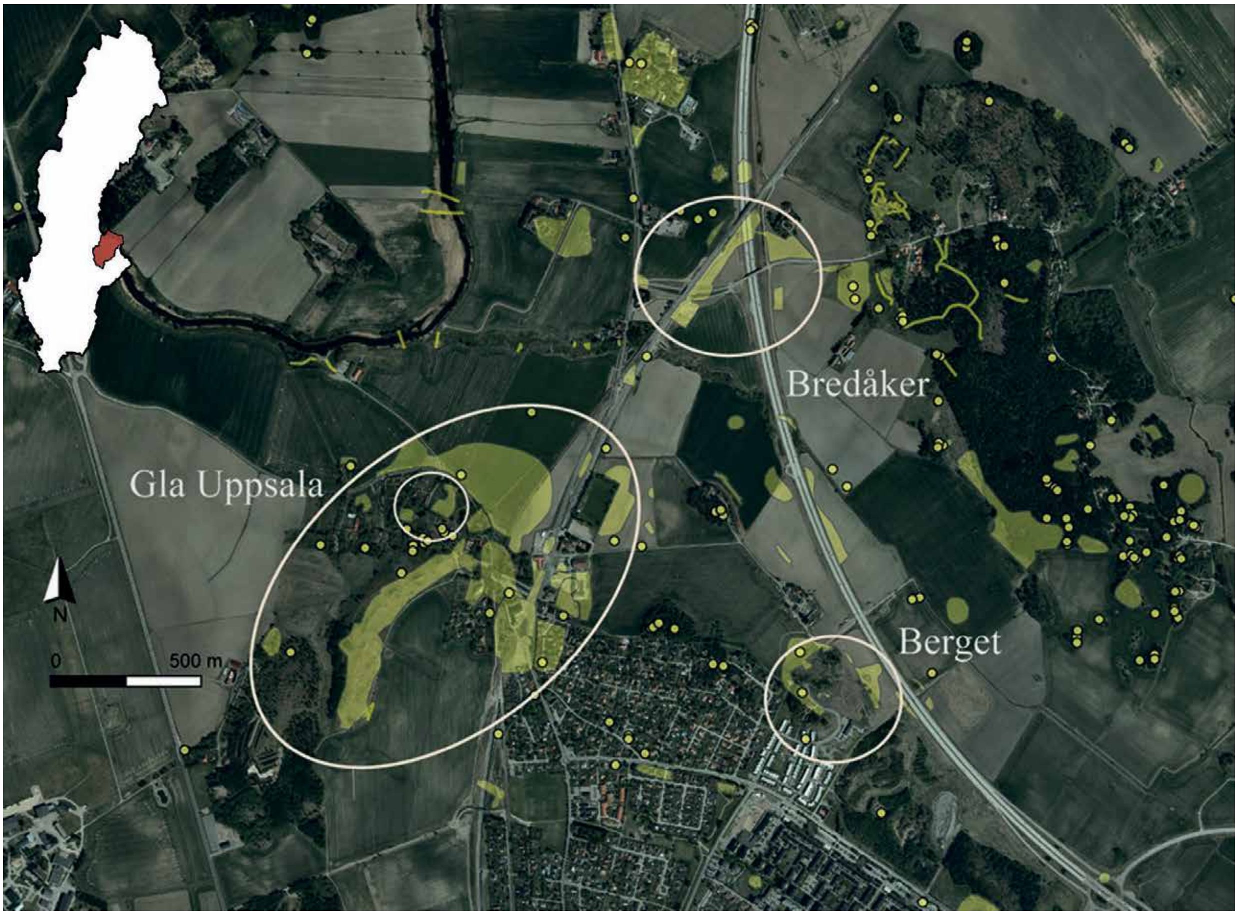

Figure 1. Orthophoto map showing the locations of Old Uppsala, Berget and Bredåker and ancient monuments (green and yellow). Surrounded areas correspond to the distribution of the settlements. For Old Uppsala, the smaller circle corresponds to the central settlement area, also referred to as the magnate farm area (cf. Ljungkvist and Frölund 2015). Illustration: Per Frölund.

During AD 400–650 more than half the farms disappeared, and the number and size of houses decreased. At the same time new fences were built on the abandoned house plots. Only one large multifunctional house was built during this period (farm G). Five farms have been interpreted to have special functions such as slaughter (farm B), tar production (C), administrative functions (D), ritual function (F2) and specialized crafts (K) (fig. 2) The size of the houses varied over time. The farms often consisted of one or two main buildings in combination with subordinate buildings. The main buildings were three-aisled multi-functional houses with shared housing and stables. The subordinate buildings are mainly made up of smaller three-aisled buildings and other forms of post-built houses. During the last stage, several farms were built with only subordinate buildings and fences. The organic traces of agriculture involve animal bones and plant macrofossils from cereals and weeds. Among the found objects are whetstones, hammer- and grindstones that can be tied to agriculture.

The land was mainly used as arable land and pasture. The cultivation system was probably made up of fertilized single fields. To maintain the yield capacity manure was needed and a suitable crop sequence of barley and wheat combined with fallow. The fallow is reckoned to have been within the same plot as the field. Thick cultural layers between the farms indicate that the cultivated fields were divided into separate and fenced plots. The division into different farms is emphasized by fences, for instance narrow fenced paths for cattle. The location of the settlement close to a large meadow area is hardly a coincidence; the cultivation system tells us it must have been a highly deliberate choice.

The settlement changed during time. From a modest beginning around 200 BC, the settlement grew markedly from the beginning of the 1st century AD to AD 200 (fig. 3). The settlement then began to decline – in the period AD 200–650 there were initially nine farms and, towards the end, three. There were five farms where

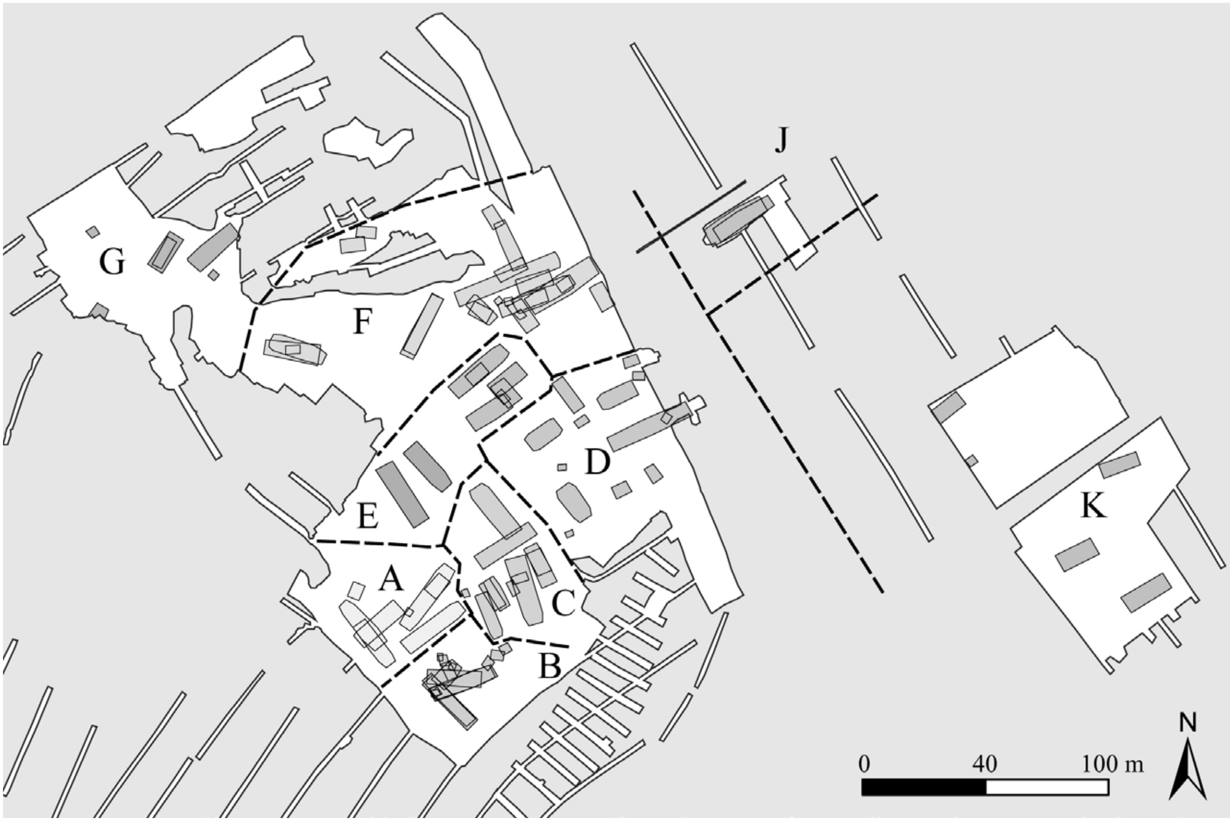

Figure 2. Farms with buildings and fences at Berget 200 BC–AD 650. Illustration: Per Frölund.

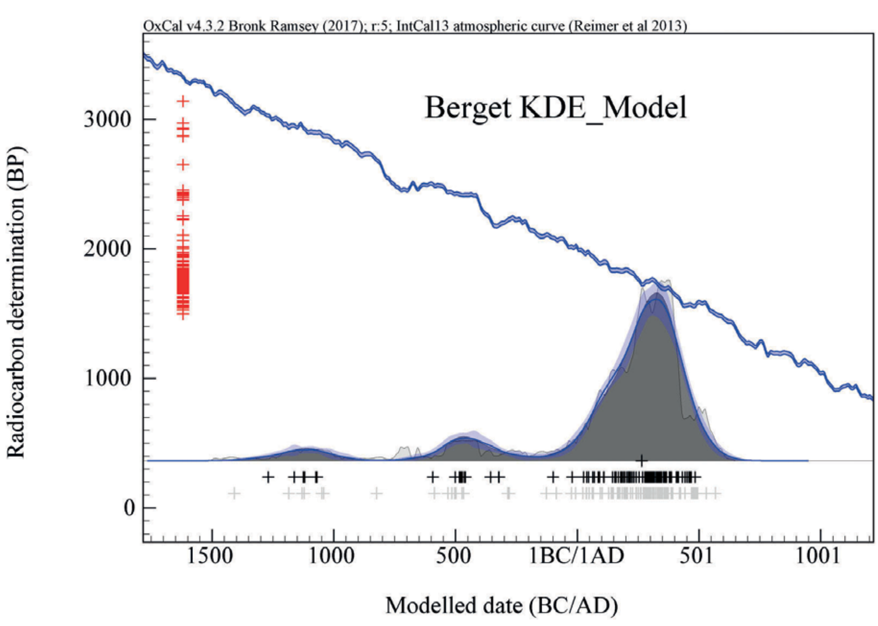

Figure 3. Berget. The diagram shows the occupation period of the settlement. KDE_Model based on 125 ^{14}C dates. For KDE_Model, see Bronk Ramsey 2009, 2017.

different conditions indicate special functions within the settlement organization. The period AD 400–650 saw drastic changes in the composition of livestock and changes in the configuration of houses, where subordinate houses and fences were built but virtually no principal buildings remained.

Bredåker

The Bredåker settlement is situated 1 kilometer north of the Berget settlement (cf. fig. 1). During archaeological excavations in 1988-2017 (Frölund 2019), more than 50% of the settlement's 150,000 m^2 has been investigated.

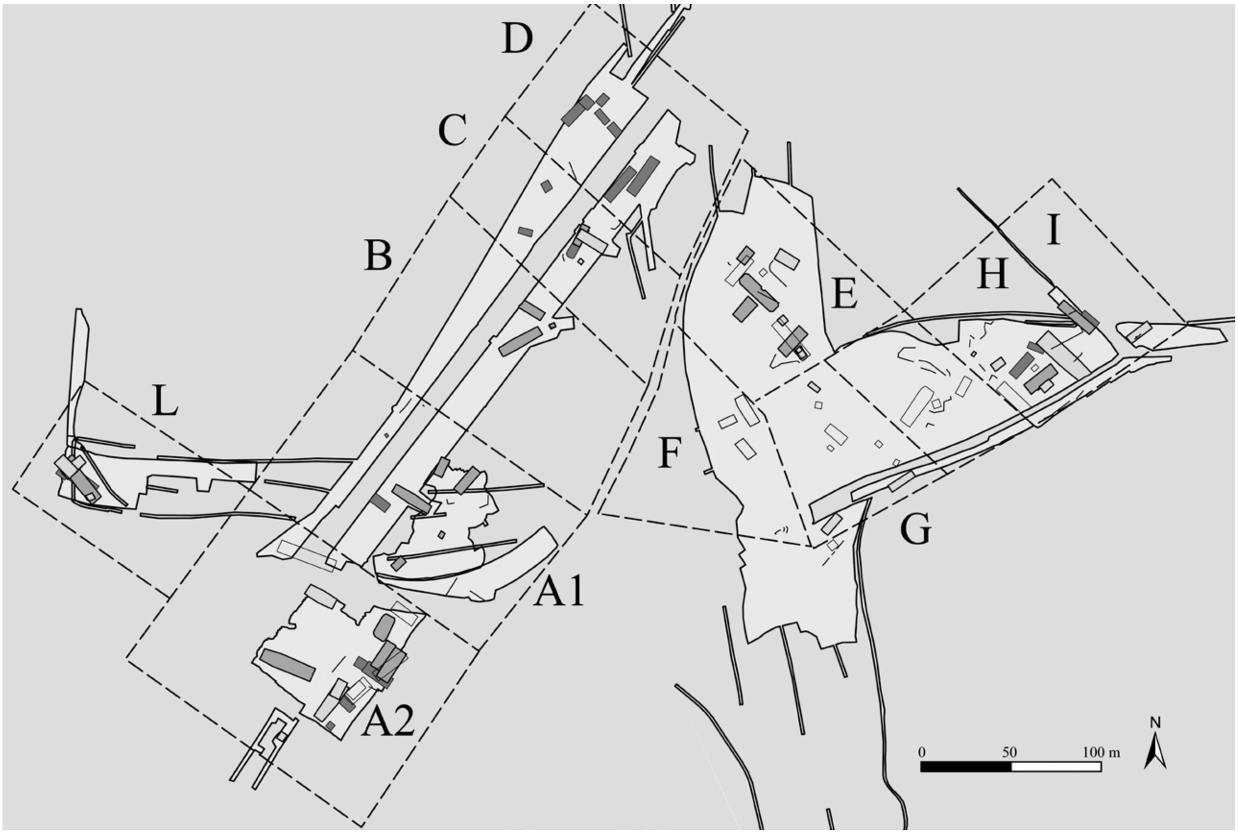

Figure 4. Farms, buildings and fences at Bredåker 200 BC–AD 650. Illustration: Per Frölund.

96 houses, many fences and other features from 500 BC to AD 650 have been excavated.

Early on the settlement was already divided into farms – this is underlined by the fences dated to 200 BC (Frölund 2019). The settlement organization was characterized by stability, where most farms existed for much of the period in question (fig. 4). Out of a total of 14 farms present during the whole settlement period, five existed as early as 400–200 BC. The largest number of farms existed AD 1–200 and AD 400–650 respectively, when the village consisted of 9–11 farms (fig. 5). A few farms seem to have been abandoned early, while some appear intermittently over several periods, and others were formed during the latter part of the settlement period.

During the residence period the size of the buildings varied. The farms often included one or two main buildings in combination with one or two subordinate houses. As in Berget, there were several farms with special functions such as slaughtering (farm I), administrative functions (J) and special agrarian functions (K) (fig. 4).

The organic remains include animal bones mainly from domesticated species but also from fish, poultry and game. Cultivation remains consist of macrofossils from cereals and utility plants and arable weeds. Among the objects found are whetstones, hammer- and grindstones, looms and a splice horn for nets.

The available land was used as cultivated fields and for pasture and forage crops, fodder, and water supply. Macrofossils of grains and arable weeds point to a farming system of fertilized single fields. The presence of cultivated layers near the farms shows that the settlement's arable land consisted of several separate farmed plots. The existence of a farm division is underlined by enclosures such as narrow, fenced paths for the cattle. A larger open area inside the settlement furnished with a well, flanked by houses and fences shows the organization and importance of animal husbandry (farm H). This area was probably intentionally laid out and maintained. There is a similarly designed structure at the so-called Chieftain´s farm in Hodde (Hvass 1988). From a resource point of view, the fact that the early inhabitants chose a place close to a watercourse, and between a large meadow and a forest, seems like a deliberate and a strategic choice.

The settlement experienced several changes during the period of residence and was early on characterized by expansion. At the onset there was one farm, increasing to five farms in the period 400–200 BC and nine to eleven farms during the period 200 BC–AD 650 (fig. 5).

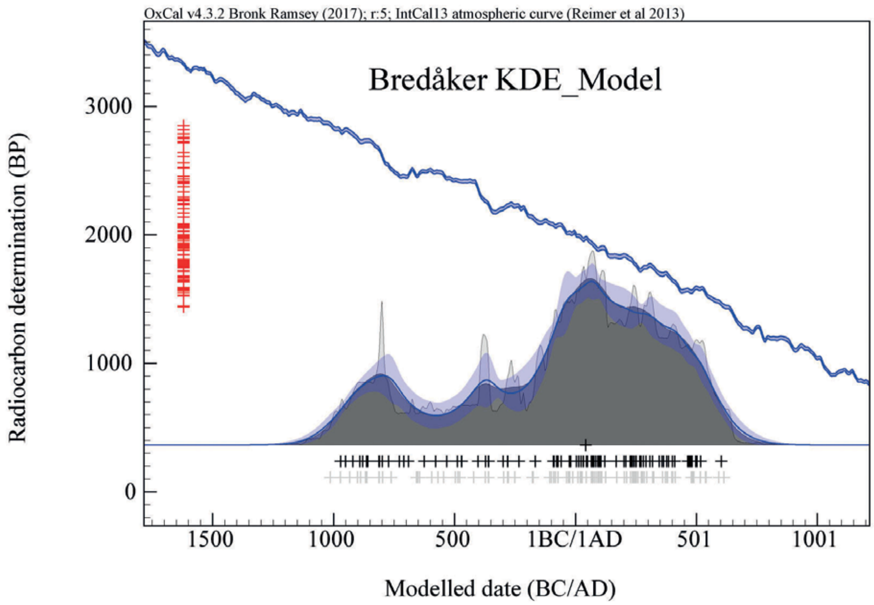

Figure 5. Bredåker. The diagram shows the occupation period of the settlement. KDE_Model based on 113 ^{14}C dates. For KDE_Model, see Bronk Ramsey 2009, 2017.

This expansion can be seen in the number of farms and buildings, in the size of the buildings, and in the finds of animal bones and plant macrofossils. By the period AD 450–650, precious metal finds such as fittings, fibulae and buckles (Frölund 2019:96, footnote 15) occur for the first time since the Bronze Age. These objects have been interpreted as gifts rather than commodities and may have been produced in the metal workshops at Old Uppsala magnate farm (Ljungkvist and Frölund 2015).

Discussion

It is more difficult to analyse changes in arable farming than in animal husbandry. From the Late Bronze Age, farmers primarily favoured cultivation of hulled barley and animal husbandry dominated by cattle. The settlements were situated in the landscape at locations which favoured grazing and fodder. This form of agriculture expanded in the period 200 BC–AD 200. The settlements potentially had access to the same resources, except that Bredåker also had access to nearby outlying areas and larger water resources. Berget and Bredåker were permanent settlements with a farm-organized agricultural production. The only non-agricultural production was tar production.

Regarding agricultural production in general, both settlements seem to have had a cultivation system of fenced fields between and outside houses. The fields were primarily used to grow hulled barley and oats and wheat. Virtually all farms grew barley, whereas oats and wheat cultivation were reserved for just some farms. Apart from flax, there is no evidence of the cultivation of other useful plants.

Livestock included cattle, sheep/goats, horses, pigs and poultry. The composition of livestock went through changes, although cattle dominated for most of the period of study. Bredåker had its largest share of cattle from AD 1 to 200, while the corresponding dates for Berget are AD 200–400. The proportion of sheep/goat and pig was higher at Bredåker than at Berget during the residence period. Pigs were especially important at Bredåker during the earliest part of the Iron Age. The mortality profiles show that cattle were primarily kept for dairy production. When it comes to sheep/goat husbandry, meat production was primary at Berget, while the focus at Bredåker was more varied.

Between AD 400–650, both settlements seem to have a more balanced distribution between different species. There is convincing evidence that hunting, and fishing were a part of the economy at Bredåker, something that is missing at Berget. The most important observation concerning animal husbandry is that Berget lacked lambs and meat-rich parts from cattle and horse. As stated above, Kooistra (1996) and Nagels (2012) identify this kind of underrepresentation as a clear sign of specialization linked to surplus production. In a subsistence economy, an even distribution of the slaughter age would be expected (Vretemark 1997).

Regarding specialized activities, the analysis shows that slaughter was a specific task for one farm in each village. And one of Berget's farms had the largest number of tar production pits found in the Mälaren basin. Each tar pit would have produced c. 15 litres per firing (Hennius 2018), which gives a total of nearly 1000 litres, if firing took place in all tar pits. Even if tar production during this period is regarded as a small-scale household activity (Hennius 2018), the number of tar production pits and the estimated amount of produced tar do not appear to reflect a small-scale activity. The surplus production of tar is clearly an example of relative specialization, i.e., production outside of the subsistence production itself, often focused on a particular crop (Bakels 1996; Groot and Lentjes 2013). Tar pits occur on four farms, but one farm (C) had 60 or 92 % of the pits. From Bredåker there is one documented tar pit. Why were relatively large amounts of tar produced in Berget? Two arguments suggest that it was probably not production for barter with other similar settlements. One is that Bredåker´s needs seem to have been met by a limited volume of tar. The second is that this production is an example of surplus production through relative specialization. The relationship may be interpreted as a certain amount of tar being produced each year as part of the settlement's collective tributes. In that case, it may be the tribute recipient who took the initiative to produce tar.

In both villages there have been farms with specialized activities as administrative, economic and ritual functions within the village organization. The economic function seems to have been more defined at Berget than at Bredåker. The question is whether we here have examples of villages with not only different organizations but also different forms of cooperation. Such differences may be due to social differences, as between free and unfree. Løken (2001) and Myhre (2002) have pointed to the possibility that both free and unfree tenants may have run subordinate farms. The tar production at Berget is a clear example of specialization that occurs at one farm and where the raw material was an outfield resource. It is, following Jørgensen's discussion concerning Gudme, tempting to see Berget's economically and socially specialized farms as an expression of a settlement incorporated into a tributary system. From this aspect, the tar production and the surplus production of certain types of meat could be seen as a tributary surplus, like *feorm*. On the other hand, Bredåker's organisational form seems to have consisted of subsistence farms.

Could the surplus production at Berget be a sign of influence from Old Uppsala? The group of people who controlled the central part of Old Uppsala provided it with central functions through the construction of the first large hall about AD 400–500 (Frölund 2019). As for the earlier period AD 1–400, there are several settlements in Old Uppsala just outside the central settlement area (Göthberg and Sundkvist 2017). At the magnate farm, there are three concentrations of settlements of different character (Ljungkvist and Frölund 2015; Frölund and Ljungkvist work *in prep*.). Thus, for the period AD 1–400, the archaeological data are currently disparate, fragmentary and inconclusive, which complicates the interpretation of the status of the central settlement.

In the period AD 550–650 several exceptionally large and extensive monuments were constructed, at the time unparalleled in Scandinavia (Ljungkvist 2013). This monumentalization should be seen as a staging of a planned strategy with the aim of confirming, manifesting and materializing Old Uppsala's increased status (Ljungkvist and Frölund 2015).

At that time the situation at Berget indicates a changed view of property, where an older concept based on the physical presence of a farming household was replaced with a new one where this was no longer necessary (Herschend 2015). The owners of abandoned farms have moved from Berget but without giving up their property. The newly built subordinate houses and fences demonstrate a different focus on agriculture with components such as barns, sheds and hedges associated with animal husbandry. The new constructions were intended to assert the right to the property, and the principle that land could be owned by people who no longer lived on the site themselves. Changes of the concept of property and property rights during this period have also been discussed by Zachrisson (2011, 2017) and Löwenborg (2012).

The transformations in agriculture and the settlement organization correlate with the construction of monumental halls, terraces and burial mounds in Old Uppsala, but is there a causal link? It is difficult to say, the changed concept of property is more likely an influence from a central place rather than from a farming community, because new ideas about rights and ownership of land should belong in central place environments such as Old Uppsala. This suggests that Berget's surplus production of certain selected products indicates that the settlement was part of a tribute system. This also suggests that the tribute system originates from Old Uppsala. It may seem like a paradox: indications of a surplus production during a period when there are (as yet) no manifest remains of central functions at Old Uppsala.

Conclusion

Firstly, it should be noted that it has not been possible to pinpoint the ratio between arable farming and animal husbandry. However, the location of the settlements with good opportunities for grazing and fodder indicates that animal husbandry was more important than arable farming. The arable farming primarily favoured cultivation of hulled barley, and animal husbandry was dominated by cattle or cattle and sheep. Both settlements cultivated and consumed mostly barley but also wheat and oats. There is no evidence of cultivation of utility plants other than flax.

The settlements' livestock include horses, goats, pigs, poultry (Bredåker) and sheep, although cattle dominated. The composition of the livestock varied over time, and the proportion of sheep/goats and pigs was larger at Bredåker throughout the residence period. But when it comes to the consumption of meat, it has been shown that the settlement at Berget did not consume the meat-rich parts from cattle, horse or annual lambs. The same observation could not be substantiated at Bredåker. Hunting and fishing have obviously been an important part of Bredåker's economy, but not of Berget's. The only non-agricultural production was tar production.

Agriculture in the two villages was thus far from static, since it changed on several occasions in the period 200 BC–AD 650. Up to AD 400 it was mostly the composition of the livestock that fluctuated, but after AD 400 the most prominent change at Berget was the decline of arable farming.

As for the issue of subsistence or surplus production, at Berget the purpose of agriculture can be interpreted as livestock surplus production. The surplus has been produced through extensification by the increase in cattle and sheep/goat farming. Additional signs of surplus production are in the form of the non-agrarian tar production. Both events occur in the years AD 1–400, when paradoxically there are (yet) no obvious signs of central functions at Old Uppsala. As for Bredåker, there is no evidence of a surplus production until the end of the settlement period, which is why the focus would have been on subsistence production.

There are indications that the Berget settlement was part of a tributary system, which can be interpreted as a sign of the impact of Old Uppsala. Firstly, surplus production of certain products occurred at Berget in the years AD 1–400. Secondly, in the following period the settlement decreased, and a reorganisation of its structure and agricultural orientation occurred, which has been connected to an altered view of ownership. In the context of a tributary society, the surplus production and the reorganisation of the settlement can be seen as a result of an influence from Old Uppsala, situated only 1 km away, which links new notions of land ownership and property rights to those who control the central place at Old Uppsala, and pioneer a change of focus for agriculture.

For Bredåker during the period AD 400–650, a change in agricultural production coincided with the appearance of objects of precious metals for the first time since the Bronze Age. This relationship can be interpreted as Bredåker becoming part of Old Uppsala's supply system as a client.

At the same time as the first large halls, terraces and burial mounds were being built in Old Uppsala, significant changes were taking place in two seemingly similar settlements in its near vicinity. It is hard to view this as of no significance. As a final notion, these Iron Age settlements should be interpreted in a relevant agrarian and a socio-economic context. Settlements were not isolated or static, they were included in various contexts involving mutual dependencies, connections and networks. As stated above, ostensibly similar settlements can be quite different socially and economically, and phenomena that are not visible centrally can manifest themselves locally.

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Burial – settlement relations at Forsandmoen, Southwest Norway

Barbro I. Dahl

Abstract

In 2017, a pre-development excavation of two burial mounds and surrounding buildings was carried out within the densely settled archaeological site of Forsandmoen, southwest Norway. The investigation provided an opportunity to explore relations between burials and buildings. It is hoped that pre-development excavations can offer fresh insight into the earlier excavations and finds. Whereas the excavated buildings cover a time span of 2200 years, all the burials in Forsandmoen appear to be from AD 300–550. This evidence leads into discussions of social changes in the Late Roman Iron Age/Migration Period, the construction and use of material culture, as well as source critical and methodological challenges. The 'construction process appears to have been more important in the local community in the Late Roman Iron Age, pinpointing a change between the two periods. The investment in building new monuments in the Late Roman Iron Age might point towards larger changes starting far earlier than the discussed break at the end of the Migration Period. The burial practice in the Late Roman Iron Age could further hint at the necessity to direct more archaeological attention towards the act of constructing material culture. Repeated use of the monuments in the Migration Period underlines that reuse and the multitemporal should be regarded more as the rule than the exception in our investigation of material culture.

Keywords: Late Roman Iron Age, Migration Period, constructing material culture, reuse, long-term perspective, multi-temporality

Introduction

At Forsandmoen in Rogaland county, Southwest Norway, research-led excavations between 1980 and 1990 uncovered a large site which has come to play a unique role in the study of settlement development in Norway. The project was the first large-scale excavation of a settlement beneath cultivated fields in Norway (Løken *et al.* 1996; Løken 1997; Dahl 2009). Through the adaptation and development of new survey and excavation methods, 275 houses covering a time span from 1500 BC to AD 700 were found on the moraine terrace. During the Late Roman Iron Age (AD 150–400) and Migration Period (AD 400–550) the settlement reached a maximum of 20 farms organized in east-west oriented rows. At the end of the Migration Period and the transition to the Late Iron Age, the settlement rapidly shrank down to two smaller areas, one within the oldest core area in the northeast and one in the southwest. In the southwest, the last inhabitants built their houses in a cluster next to a grave mound. This mound, as well as another mound and the entire southern part of the large settlement remains, were excavated in 2007 and 2017 (Dahl 2008, 2009, 2019). The pre-development excavations offered an opportunity to investigate two large mounds and their

In *Complexity and dynamics. Settlement and landscape from the Bronze Age to the Renaissance in the Nordic Countries (1700 BC–AD 1600)*, M. Ødegaard and I. Ystgaard (eds.), pp. 171-186. Sidestone Press, Leiden.

relationship with the entire southern part of the settlement. In order to serve as generators of research and future strategies, pre-development excavations have to raise new questions, perspectives and ways of perceiving the past. The challenge of the excavations in 2007 and 2017 was to generate new insights and raise new questions from the largest research project of the Museum of Archaeology, University of Stavanger.

The settlement at Forsandmoen was first discovered in 1980 during excavation of one of the many cairns on the terrace (Bårdsgård 1980a-c). In large open-area excavations burials and buildings are typically treated separately during both fieldwork and post-excavation analysis (Dahl 2016b). Up until the Forsandmoen project and the introduction of the large-scale excavation of cultivated fields in Norway, the presence and development of Iron Age settlement was inferred from preserved graves visible in the landscape (Løken 1974; Myhre 1981; Ødegaard 2007). We need to bring together and discuss material from both cultivated fields and pastures (Dahl 2020). In this sense, the farm complexes preserved in the pasture areas, which used to be one of the main objects of archaeological investigations in southwest Norway prior to the Forsandmoen project, are important reminders of the close link between buildings and burials in the Iron Age. Houses and graves are interrelated aspects of landscape organization (Dahl 2016b), and both the large number of houses and all the previously excavated mounds in Forsandmoen have to be put into play.

Relations between burials and buildings have previously been discussed, drawing on regional cases, in Rogaland (Dahl 2016b) and Mälardalen in Sweden (Stenholm 2006, 2012), as well as in a larger geographical perspective through five cases of reuse in Norway and Sweden (Eriksen 2016). While reuse was a central theme in these studies, the aim of this paper is to use the large material from Forsandmoen as a possibility to explore relations between contemporary buildings and burials. However, reuse is considered to be an inevitable aspect in analysis of burial practices (Dahl 2016a), as an example that can highlight multi-temporality and challenge the long-lived linear time in archaeological practices of today (Olsen 2010; Olsen *et al.* 2012; Dahl 2020). There is a fascinating tension regarding reuse and multi-temporality. The urge to slice different forms of use into successive sequences that can be dated and placed on an axis of time is experienced as a crucial step towards gaining more knowledge of past practices. This paradox is a challenge that helps to put our present archaeological practises in perspective. The dissection and destruction of archaeological sites appears to be the opposite practice of people in the past constructing and reconstructing the material culture.

The aim of investigating contemporary buildings and burials is another challenge that illustrates fascinating tensions between past and present multi-temporality. In the same manner as the present is not comprised of things belonging to the same age, but takes the form of a multitemporal field in which the past has accumulated itself (Olsen 2010:108), people in the past were not living in a context merely made up by contemporary things. This comes into play not only regarding the reuse of burial monuments, but also in the construction of mounds superimposed on earlier buildings, as well as the already mentioned only remaining cluster of houses built next to the mound with burials from previous periods. The layering of the past in the present is hard to conceive of without things (Olsen 2010:120). Symmetrical archaeology can be used as a component and a guideline (Olsen and Witmore 2015; Pétursdóttir and Olsen 2018), as a critical commentary to the conceptions of history as inevitably successive, of the past as gone and of memory as only a recollective capacity that might be activated in search of this lost time (Olsen 2010:8). From an archaeological perspective it is necessary and rather uplifting to accentuate the role things themselves play in enabling and in upholding the past. In this paper, I further wish to emphasise the construction and use of monuments, as a remixing of things seen in the longevity of burials and buildings throughout the Late Roman Iron Age and the Migration Period.

The excavation of two mounds in 2017

The mounds located at a distance of 64 metres from each other illustrate the variation and complexity that might be expected when excavating burial monuments (Dahl 2016a). The mounds had a similar appearance with heights of 1.2 metres and diameters of 11–13 metres. The northern mound (Mound 2) had a large plundering pit in the centre, while the southern mound (Mound 1) had several visible, but luckily superficial, disturbances caused by modern agriculture (fig. 1).

Mound 1 consisted of a complex layering of turf bricks and sorted stones (fig. 2). The first context in the construction sequence was a rectangular stone layer, from where thin, alternating layers of stone and turf were made. On the eastern and western edge two cremation burials were cut into the rectangular stone layer. In the middle of the two burials a third funerary context was placed on top of the rectangular stone layer. The sequences of turf and stones, and the funerary contexts within them, were sealed by a 1.2 metres thick stone layer.

The western cremation burial contained three glass beads, a decorated spindle whorl, one fragmented bucked shaped vessel and burnt bones from one, perhaps two, juveniles (Denham 2019). The beads were deformed by high temperature. The eastern burial contained four glass beads, a fragmented, decorated bone comb, a fragmented, decorated vessel of finer tableware and the burnt bones from an adult (Denham 2019). Neither of the burials had a distinct burial chamber.

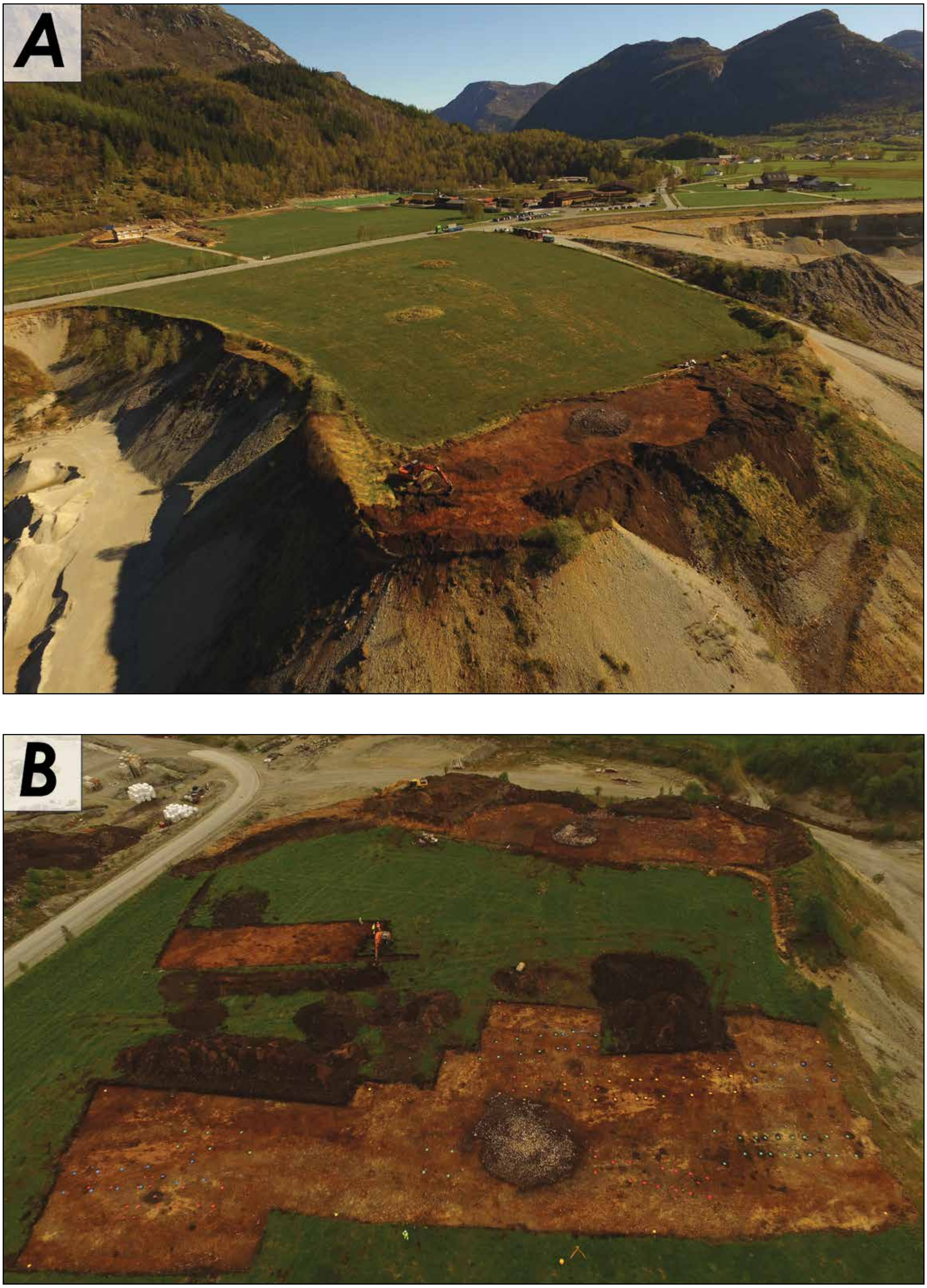

Figure 1. A) Overview of the settlement area at Forsandmoen at the start of the excavation in 2017. Mound 1, in the southwestern part of the settlement, has been uncovered. B) Mound 2 surrounded by buildings. Mound 1 is visible at the southern edge of the excavation area in the background. Illustration: Theo Gil, Museum of Archaeology, University of Stavanger.

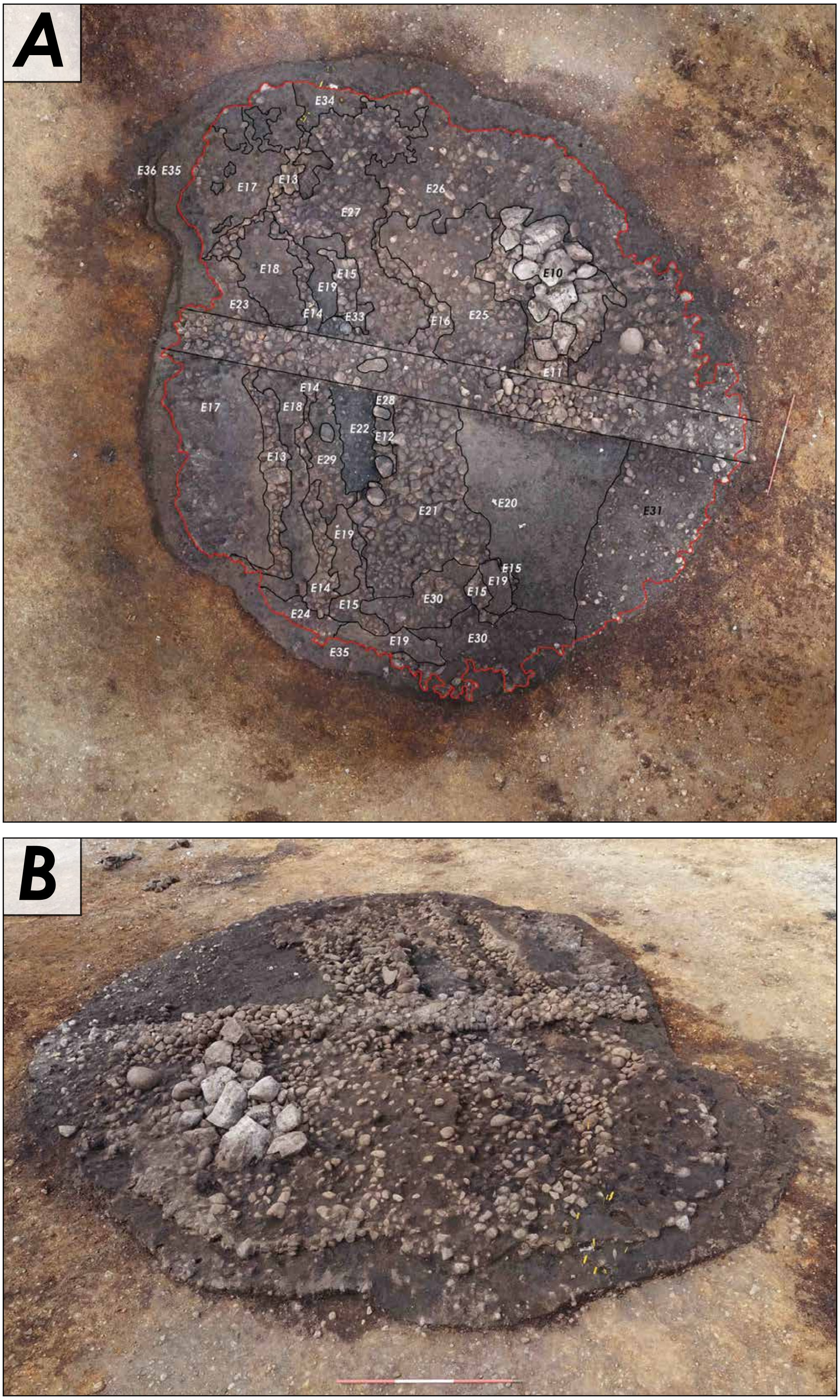

Figure 2. Identified contexts towards the bottom of Mound 1, seen from above (east is up) (A) and seen towards west (B). Yellow sticks mark the eastern burial. Photo A: Theo Gil, Museum of Archaeology, University of Stavanger. Photo B: Barbro Dahl.

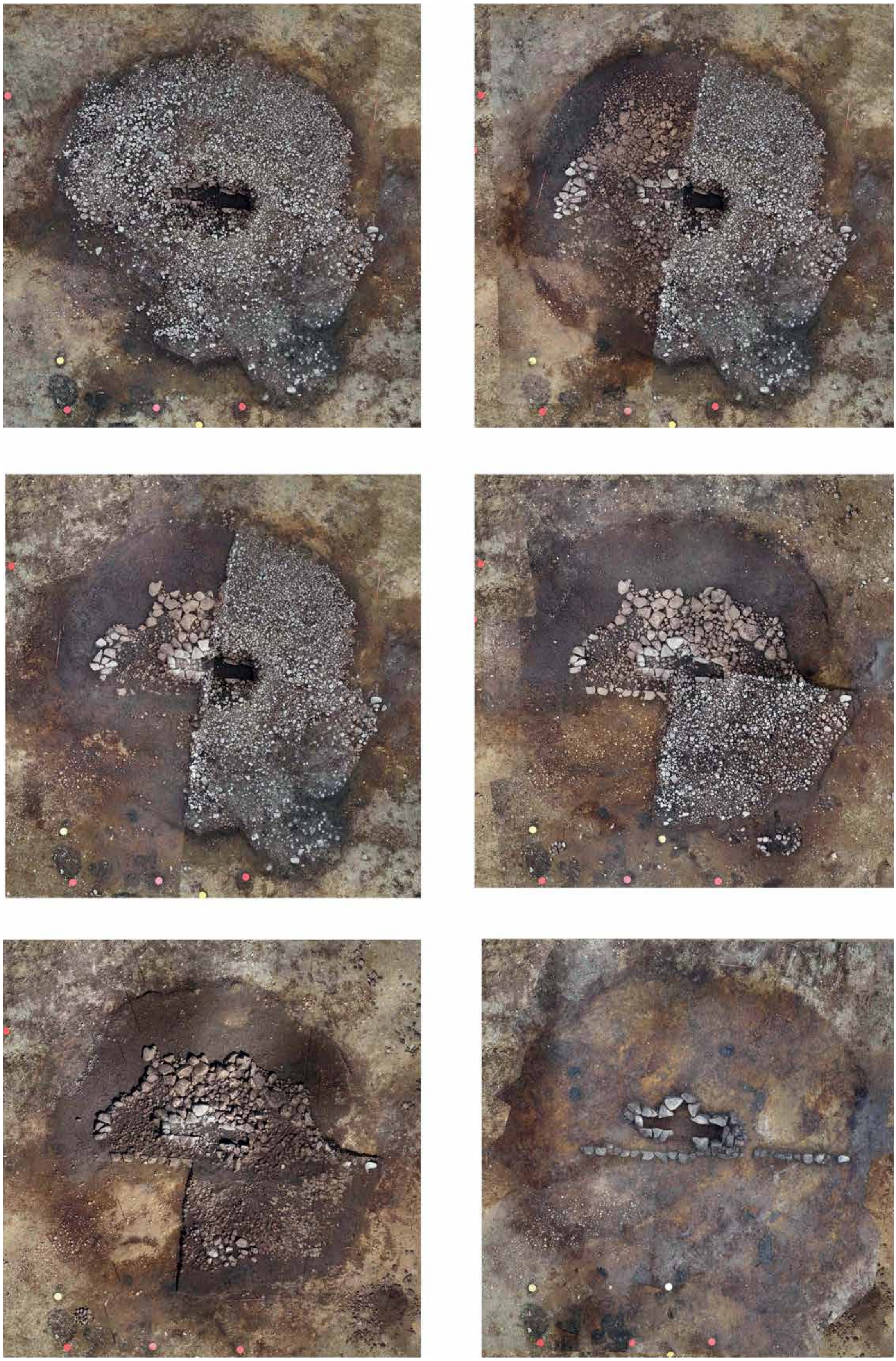

Figure 3. Mound 2 during excavation. Illustration: Theo Gil, Museum of Archaeology, University of Stavanger.

The funerary context in the centre of the mound was a thick, rectangular charcoal layer outlined by fire-cracked stones. The layer measured 2.4 × 0.6 metres. Two glass beads were found in the layer, as well as an unidentified iron fragment, two round stones and a perforated piece of burnt oak. During excavation, this feature was interpreted as the remains of the cremation pyre for the two cremation burials on the eastern and western edge of the mound, although no burnt bones were found. The compact charcoal layer and the fire-cracked stones indicate that burning has occurred on top of the bottom stone layer. On the other hand, its elongated regular shape, outlined by larger stones, resembles the bottom of an inhumation chamber.

The bones from both cremation burials are dated to AD 128–322 ± 30 (Beta-498541 and 498542). However, burnt plant materials from both burials are dated to AD 382–538 ± 30 (Beta-498547 and 498548). Organic residues from the ceramic in the western burial are dated to AD 253–406 ±30 (Beta-498549). Marine reservoir effect may be the reason for the older dates of the bone samples (Denham 2019). Another factor that has been debated is the old wood effect on burnt bones (Olsen *et al* 2013). The burials would thus be dated by the plant material to the transition between the Late Roman Iron Age and the Migration Period, coherent with the diagnostic finds.

While Mound 1 had several simultaneous burials sealed by one grave monument, Mound 2 consisted of three superimposed constructions. The first phase was a circular mound built of small stones mixed with loose, grey soil. Over the northern part of the earliest mound, a half-circular mound was constructed. Its unusual shape was outlined by larger stones dug deep down into the earlier mound. These two earlier monuments were completely covered by a circular mound with a diameter of 13 metres. In the centre of the latest mound a large, rectangular grave chamber was found. The chamber had an inner length of 3,3 metres and was oriented east-west. The chamber had been inserted into the previous constructions, probably disturbing earlier burials. In other superimposed burial monuments large chambers have intentionally been constructed on top of earlier burials (Møllerop 1953a and b; Randers 1988; Dahl 2016a).

The excavation of the superimposed mounds revealed two distinct burial contexts with multiple individuals and different body treatments. In addition, sherds from at least five different vessels and bones that could not be positively identified as human were found scattered in different locations. Although the spread of these finds may be due to later disturbance, we cannot disregard the possibility that they may belong to other funerary rites.

No remains of bones were found in the chamber. A pair of bronze tweezers were recovered from the eastern end of the chamber, while 218 fragments of heavily corroded iron were found concentrated in the western end. Among these iron fragments, 33 pieces are parts of a two-edged sword, with traces of textile and leather, while 22 fragments belong to six different knives. The many iron objects found compressed at the bottom of the chamber may indicate heavy disturbance. The chamber contained sherds from at least six vessels. The finds indicate the presence of several inhumation burials. Four of the vessels in the chamber are bucket shaped, some of them undoubtedly from the last part of the Migration Period (Kristoffersen and Magnus 2010). Two sherds of soapstone may even indicate deposits from other periods in the chamber.

A cremation burial was found in a stone packing on the southern side of Mound 2. The burial contained a large concentration of sherds from one bucket shaped vessel, three sherds from a finer handle vessel and burnt bones from one adult and one younger individual (Denham 2019). The bones are dated to AD 210–383 ± 30 (Beta-498551). The cremation burial of the two individuals was marked by a packing of larger stones placed on top of the oldest mound. Both individuals appear to have been buried together at the same time, in the same way as the two juveniles buried in the western part of Mound 1. However, Mound 1 contains several individuals buried separately and simultaneously, illustrating the variation and complexity in the mortuary customs at the transition between Late Roman Iron Age and Migration Period.

Mound 2 overlapped House 10 (fig. 1 b). The postholes under the mound have been dated to AD 133–242 ±30 (Beta-498557 and 498558), representing a *terminus post quem* for the primary mound construction. The youngest radiocarbon date from Mound 2, AD 346–536 ± 30 (Beta-498554), comes from charcoal found directly under the stones in the chamber wall and represents the limit after which the large chamber was constructed. Six other radiocarbon dates from charred organic material sampled from different contexts in Mound 2 fall within the range AD 130–326 ± 30 (Beta-498543, 498544, 498552, 498553, 498555, 515249). These dates indicate a time span within the Late Roman Iron Age for all the construction sequences between the first mound and the large chamber.

A close parallel to Mound 2 was excavated in the southeastern part of Forsandmoen in 2000 (Gellein 2000; Gellein and Skjelstad 2001). The mound consisted of numerous superimposed constructions (see fig. 4). Larger stones mixed with a lighter sand layer was interpreted as an initial burial mound with an outline of stones and a diameter of 14 metres (Gellein 2000:5–6). No burial contexts were identified in association with the earliest mound. A circle of stones with a diameter of 4 metres represents a younger phase on top of the earliest mound, and turf visible in the profile indicate a time gap between these constructions (fig. 4). A large

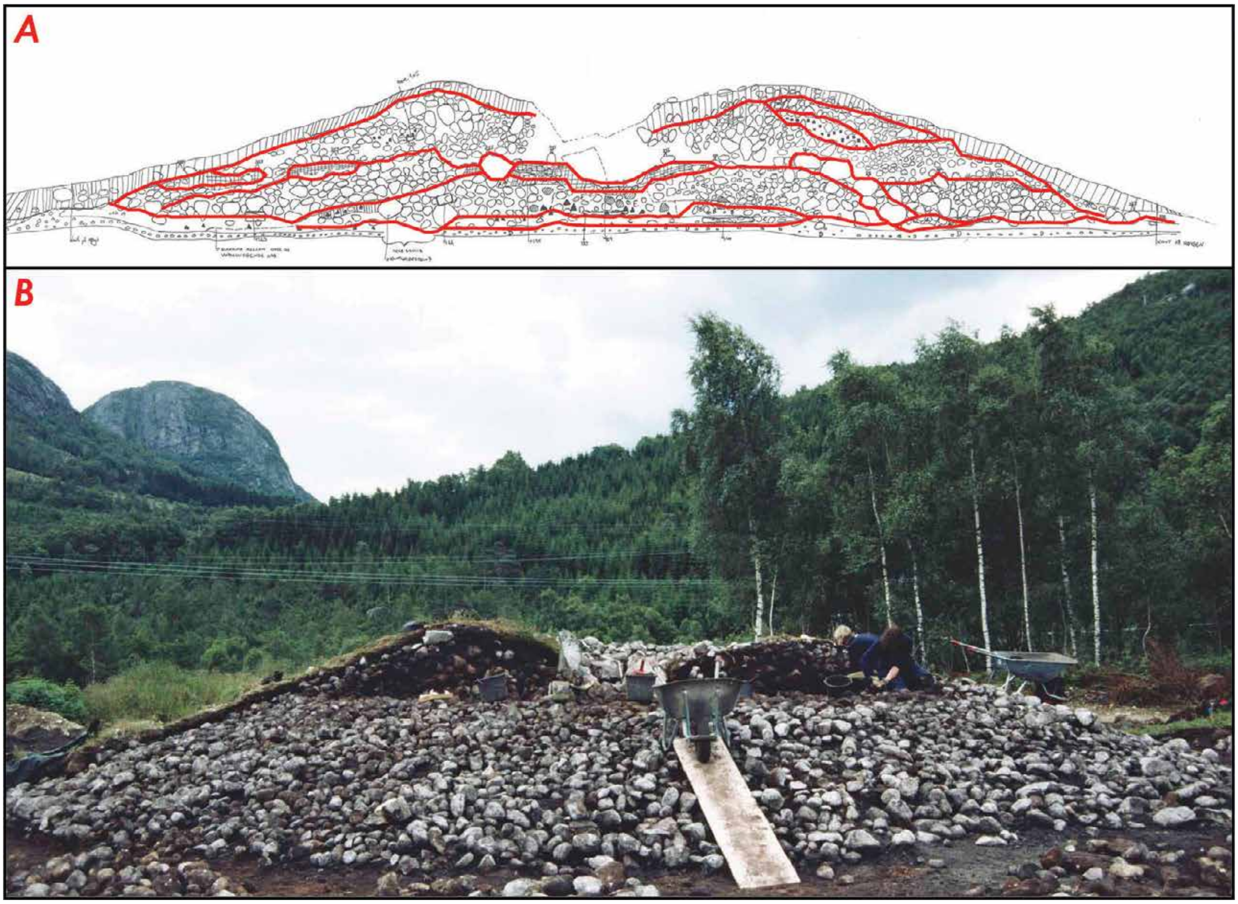

Figure 4. The mound excavated in 2000 in the southeastern part of Forsandmoen (see fig. 5). A: A new sketch suggesting several construction phases. Based on the layers documented in the profile in 2000 B: The mound during excavation. Photo: Thomas Bruen Olsen, Museum of Archaeology, University of Stavanger.

grave chamber was built within the stone circle. One or two burials with weapons, a gold ring and bucket shaped ceramics, as well as burnt animal bones, were found on top of the stone circle, at the same level as the bottom of the chamber (Gellein 2000; Sellevold 2001a and b). Bucket shaped ceramics give a typological date to AD 450–500. The large chamber in the top may have been used for several burials. Burnt bones identified as an adult individual (Sellevold 2001b), a spindle whorl, ceramics and a gilded silver clasp with niello were found in the chamber.

Source criticism and representativeness

Figure 4 from the mound excavated in 2000 in the southeastern part of Forsandmoen is an example of new interpretations of previously investigated grave mounds facilitated by new excavations. Regarding far older investigations, the objects in the museum magazines might represent the only information about a grave mound. New excavations represent important opportunities to raise new questions and use the material in the magazines and archives. The two mounds excavated in 2017 will be discussed in the context of previously excavated mounds in Forsandmoen (tab. 1). In 1930 Jan Petersen registered 47 mounds at Forsandmoen (Petersen 1930). We know of finds from 18 of these mounds. With one exception (Reiersen 2021), all the finds that can be diagnostically dated fall within the Late Roman Iron Age/ Migration Period, as well as all the radiocarbon dates from graves excavated during the last 20 years (tab. 1).

The impression we get from the grave finds in general do not correspond well with what we know about the size and chronology of the built environment at Forsandmoen. The number of grave finds, their narrow chronology and status do not indicate a 2200 year long and massive settlement with houses up to 50 metres in length. The discrepancy between the known grave finds and the large settlement offers a challenge regarding representativeness and source criticism. An interpretation of the farm and its development based solely on the presence, distribution

Year	Location (in Forsandmoen)	Construction	Burials	Placement of the burial	Pos. Gender	Typ/ra-dioc. AD	Finds	Reference
1905	Building of youth center	Mound	Cremation		Female	LRIA (C3)	S2757: 1 finer handle vessel, 1 bucket shaped vessel, bow brooch, spindle whorl of clay, spoon and needle of bone, burnt bones	Helliesen. 1905:fig. 7
			Cremation (+inhumation)	Chamber		LRIA/MP	S2758: Bucket shaped ceramic, burnt bones	
1907	Forsandmoen	Small mound	Cremation	Small chamber/ cist (l=1m)	Female (+male?)	MP	S2948: Spearhead, lance, cruciform brooch, bow brooch, tweezers, scissors, knife, whetstone, finer handle vessel, burnt bones	
1916		Mound previously dug by Helliesen (see S2758)			Female	MP (D1)	S3887: Cruciform brooches	
1919	Removed during farming		Cremation		Female	MP	S4082: 2 cruciform brooches, bucket shaped ceramic, finer table ware, spindle whorl, fittings, claw, burnt bones	
1921	SW. Gnr. 41/5. 50m from id. 14501	Cairn. No soil. Rather large.		Small cist (0,7x0,4x0,3m)	Female	MP	S4162: Cruciform brooch, bucket shaped ceramic	De Lange 1921-24
1926	Gnr. 41/23 (Ryggjen/Gjøyse)	Mound					S4819: 2 ceramic vessels	Jan Petersen 1927
1945	W. Id. 14501. Removed by farming	2 mounds D=12m, chamber in remaining part	Inhumation + cremation?	Chamber (2,4x0,47m)	Male?	MP	S7086: Bronze ring, spearhead, 2 bucket shaped vessels, awl, iron fragment, burnt bones, charcoal	Jan Petersen 1945
1980	SW. Gnr. 41/5. Id. 71854. 2 cairns	Oval mound L=6m, br=4,5m, h=0,4m [1]		Ceramic from features under the cairn			S10548: Sherds from 10 different vessels, whetstone, slag, resin	Bårdsgård 1980a, 1980b, 1980c
		Low, oval mound D=6m, h=0,3m [2]	Cremation	Cist (0,3x0,4m) in the NE [3]	Female		S10556: Spindle whorl, sherds tempered with asbestos, iron and bronze fragments, quartz and burnt bones	
1984	SW. Gnr 41/5	Mound VII. D=6m, h=0,75m	Cremation?	Small cist with some charcoal		200-600 (ca.)	S13192: 10 sherds found under the first stone layer, charcoal samples from cist	Løken 2009
1992	Gnr. 41/4 Id. 14499	Cairn D=7m, h=0,7m (Cairn 1)	Cremation (Burial 1)	Larger concentration of burnt bones	Female	385-550 (T-10703)	S11256 (Burial 1): Bronze pendant, 3 fragmented bronze fibulas, 52 pieces of glass, 10 glass beads, undecorated bucket shaped sherds, burnt bones	Hemdorff og Kjeldsen 1992, Kjeldsen og Hemdorff 1992
			Cremation (Burial 2)	Smaller concentration of burnt bones under large stone		LRIA/MP	S11256 (Burial 2): Ring for tweezers, bone comb, 83 bucket shaped sherds decorated with lines, burnt bones	
		Remaining half L=9m, br=3,5m, h=0,5m	Cremation	Concentration of burnt bones and charcoal			S11257: Iron ring with fragment of tweezers of bronze, 4 bucket shaped sherds, sherds from a finer handle vessel, iron hook, burnt bones, charcoal	
			Cremation	Charcoal concentration with burnt bones in the E	1 adult	MP	501,5 g burnt bones (human)	
1992	SE. Gnr. 41/3. Reconstructed	Long cairn. L=30,4m, br=3,8-5,0m, h=0,7m.	Cremation	SW-side of the kerb	1 adult		S11258: Decorated ring of bronze for tweezers, 34 sherds leirkarskår, burnt bones, charcoal	Hemdorff and Kjeldsen 1992, Hemdorff 1992

Table 1. Grave finds from Forsandmoen.
[1] Middle-sized stones mixed with large amounts of soil.
[2] Small- to middle-sized stones mixed with little soil.
[3] Burnt bones and charcoal found in the small cist. The other finds from five spots outside the cist.
[4] Charcoal and burnt bones inside and outside the small cist.
[5] The concentration of burnt bones and charcoal found in the plundering pit (D=2m).

Year	Location (in Forsandmoen)	Construction	Burials	Placement of the burial	Pos. Gender	Typ/ra-dioc. AD	Finds	Reference
2000	SE. Gnr. 41/3, 26. Id. 14272.	Mound with several phases D=14m, h=1,8m	Cremation+inhumation	Chamber	Female		S11865: Gilded button of silver with niello, spindle whorl, sherds, burnt bones from an adult individual	Gellein 2000, Gellein og Skjelstad 2001
			Inhumation	Outside bottom of chamber	Male	450-550 (typ)	S11865: Ring of gold, shield grip, spearhead, lance, 5 arrowheads, scissors, burnt animal bones, several vessels (bucket shaped from 450-500AD)	
2001	SE. Gnr. 41/3, 26. Id. 61178.	Cairn D=16m, h=1m	Several cremations	Small cist of four flat stones (0,7x0,35m) [4]	Female	MP	S12027: Glass beads, spindle whorl, sherds (finer handle vessel), fitting, metal band, small rivet, burnt bones	Sørheim 2007
2017	SW. Gnr. 41/5. Id. 14498.	Mound 1 D=11m, h=1,2m	Cremations W		2juveniles	128-322, 253-406, 382-538 (Beta-498542, 498549, 498548)	S13867.1-5: 3 glass beads, decorated spindle whorl, bucket shaped vessel, burnt bones, burnt clay	Dahl 2019
			Cremation E		Female	128-322, 382-538 (Beta-498541, 498547)	S13867.6-12: 4 glass beads, bone comb, a decorated vessel of finer table ware, burnt bones, burnt clay	
			Cremation/pyre	Cist (2,7x0,6m)	Female?		S13867.13-16: 2 glass beads, iron fragment, perforated object of oak, 2 round stones	
	SW. Gnr. 41/5. Id. 34151	Mound 2 D=13m, h=1,2m	Inhumations	Chamber (3,3x0,6m)	Male	MP (late) (typ)	S13868.1-10, 12, 13, 19, 20, 23, 25: Sword, tweezers, 6 knifes, 4 bucket shaped vessels, 1 finer table ware vessel, 2 sherds of soap-stone, 1 iron rivet, 218 iron fragments	
			Cremations		1 adult, 1 child	210-383 (Beta-498544)	S13868.11, 14, 28: 59 sherds from one bucket shaped vessel, 3 fine tempered sherds, burnt bones from 2 individuals	

Table 1. continued.

and character of the finds from graves would have been inadequate in the case of a massive site like Forsandmoen.

All typologically dated burials fall within the Late Roman Iron Age and Migration Period, the latter period dominating. We only know of one mound with finds from the Pre-Roman Iron Age (Reiersen 2021). The complete domination of burials from the Late Roman Iron Age and Migration Period cannot be explained by the burial customs. Late Roman Iron Age and Migration Period burials seem to have been placed in the mounds and not dug down into the subsoil, as we, for instance, more commonly observe in the Viking Period (Dahl 2016b). The majority of known finds from burials at Forsandmoen have been found while removing or excavating mounds, and, considering the extent of the settlement area uncovered by top-soil stripping at Forsandmoen, any burials placed in the subsoil should have been identified. Investigating all features that might represent burials preserved in the subsoil around the mounds and buildings was heavily prioritized during the excavation in 2017. The absence of burials from other periods than the Late Roman Iron Age and Migration Period indicates mortuary customs that left no preserved traces identifiable as burials, either in the large areas of uncovered subsoil or related to the fully excavated mounds of 2017.

The diagnostic ceramics play a crucial role in the identification of burials from Forsandmoen. The mounds excavated in 2017 illustrate the complexity surrounding burials containing diagnostic ceramics from Late Roman Iron Age and Migration Period, in particular the deposition patterns. In the case of Mound 2, the type of ceramic from the chamber would have led us to place the mound in the later part of the Migration Period. There is only one radiocarbon date stretching into the Migration Period, while all the other radiocarbon dates from Mound 2 are older and concentrated within the Late Roman Iron Age. The relationship between the radiocarbon dates and the diagnostic finds draws attention away from one particular age and towards a longer duration of use.

The time span within the Late Roman Iron Age and Migration Period is an argument for the need to approach burial monuments as potentially being used for several burials over a longer stretch of time. However, this approach has not been very evident in earlier excavations, where an individual burial was identified and typologically dated by the grave goods. Chasing singular burials solely dated by

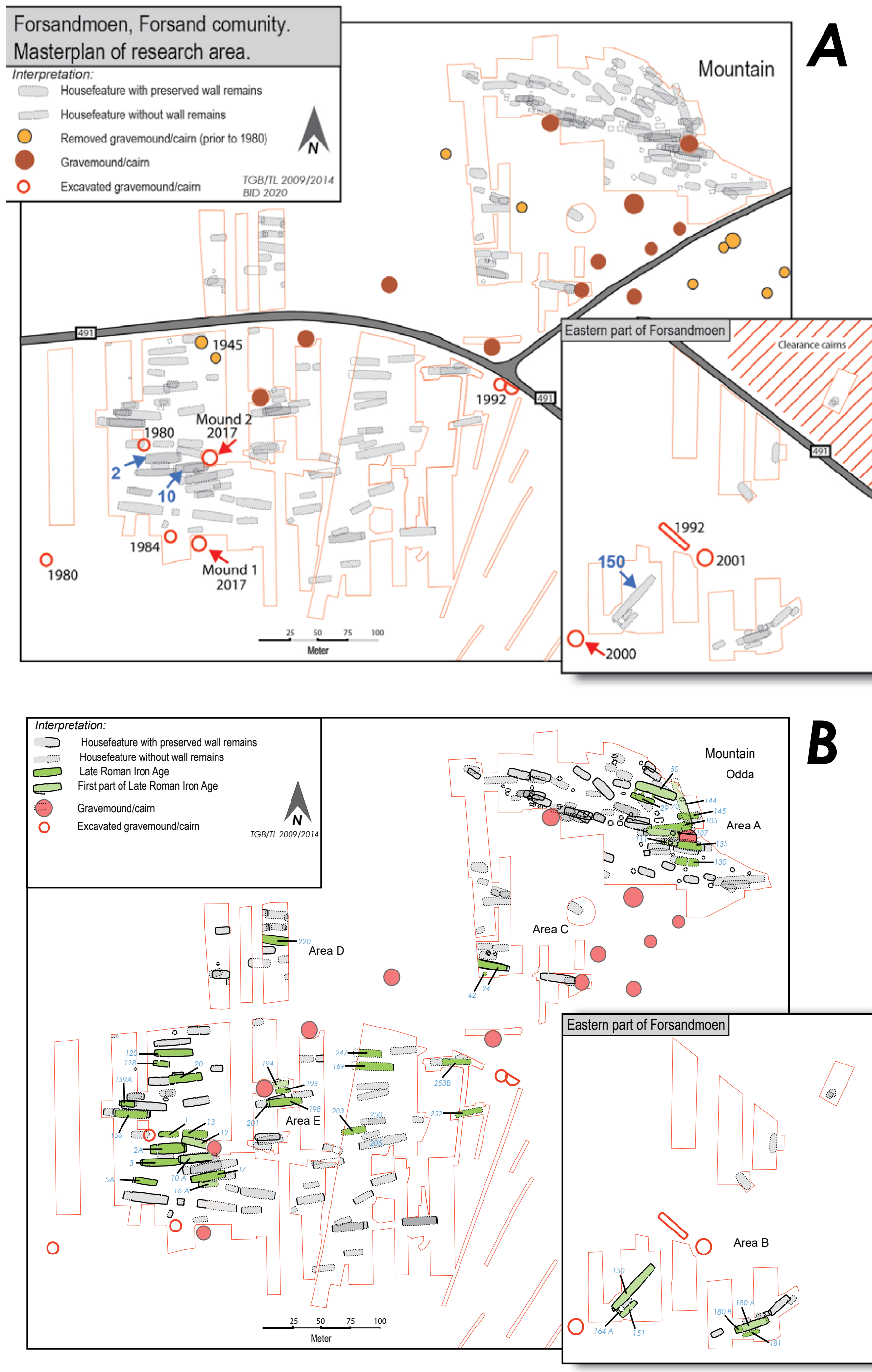

Figure 5. A) Mounds mentioned in the text marked by red arrows, mentioned houses marked by blue arrows. Prior to 1980 mounds were removed without excavation and exact locations are uncertain. Mounds excavated from 1980 onwards named by year of excavation (see table 1). Illustration: Theo Gil, Museum of Archaeology, University of Stavanger, based on Løken 2020. B) Houses from the Late Roman Iron Age. C) Houses from the Migration Period. D) Houses from the Merovingian Period. Illustrations B, C and D from Løken 2020.

diagnostic finds represents other source critical challenges that we have to be aware of when analysing material from older excavations. Still, if we keep the two periods Late Roman Iron Age and Migration Period together, most of the radiocarbon dates from the two mounds excavated in 2017 fall within the same time span as represented by the diagnostic ceramic present in 16 of the mounds in Forsandmoen. At the same time, Mound 2 might be representative for other burial monuments at Forsandmoen, where the use of radiocarbon dates has detected earlier use than diagnostic finds limited to the Migration Period (tab. 1). Based on recent excavations, all the burials from the Late Roman Iron Age and Migration Period can be seen as representative and actual. In fact, the continuous use documented in Mound 2 suggests an even higher frequency of burials in the Late Roman Iron

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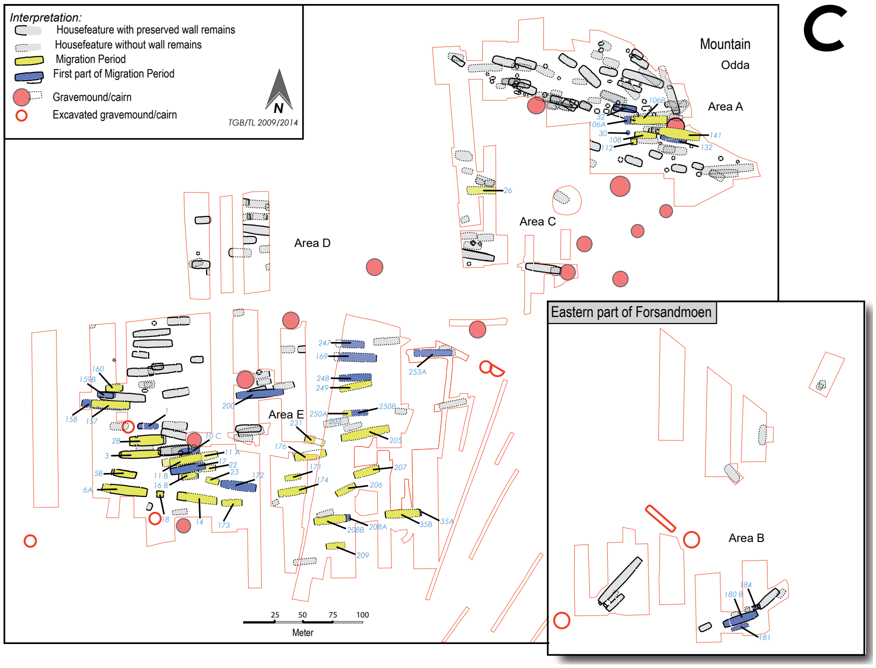

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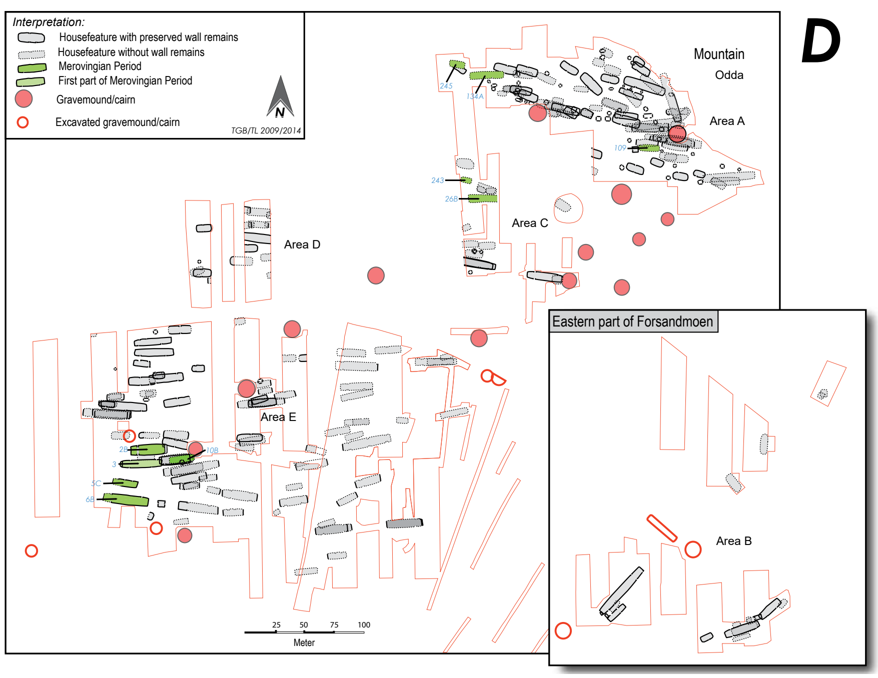

Age and Migration Period than the impression we get from table 1, revealing the contrast between old and modern excavations.

Continuous use of the burial monuments represents a challenge in a quantitative comparison with the number of farm units. We cannot assume a 1:1 relationship between a mound and a burial, or that all the un-excavated mounds are from the Late Roman Iron Age and Migration Period. At the same time, we cannot assume that the buildings of a farm unit have been used only by one generation. The finds we know of are primarily from the southern and eastern part of the settlement since the mounds in the northeast have not been excavated (see fig. 5). At the peak of the settlement, Forsandmoen had 20 simultaneous farm units and we have finds from 19 mounds. However, the number of mounds with finds we know of is low, considering the 47 mounds registered at Forsandmoen in 1930 (Petersen 1930). Eleven of the 19 mounds with finds at Forsandmoen contain more than one burial. Most of the identified burials are cremations, which are far easier to identify and date. There are also three mounds with large chambers. We assume that the chambers were built for inhumations (Dahl 2016a), although burnt bones were also present in two of these chambers. Here the burnt bones provide the strongest indication of reuse. In the grave chamber of Mound 2, the high number of vessels, and sherds from different periods, also indicate multiple burials. Since most burials contain bucket shaped ceramic or finer table ware, a future study of these types of ceramic has great potential for providing more specific typological dates for the burials and identifying longer sequences of use.

Built to last

The continuous use of larger burial mounds mirrors the longevity of many buildings from the Late Roman Iron Age and Migration Period. Repairs and replacements of roof-bearing postholes are common in the large constructions. In many cases new buildings have been rebuilt on the same spot as previous buildings, with the same orientation of the aisles (Dahl 2008, 2009). Trond Løken has argued for long lasting houses in the Late Roman Iron Age and Migration Period (Løken 1991:27, 2006:312). Both houses and graves appear to have been built to last. They have been repaired, expanded and rebuilt, in such a way that the Late Roman Iron Age and Migration Period stands out as a continuum. Both the dead and the living were tightly incorporated into the established built environment. The period at the peak of the settlement at Forsandmoen gives an impression of continuity between the generations, with a focus on maintaining the status quo and existing power relations.

There is a close relation between the large buildings and the large mounds at Forsandmoen (fig. 5 a). The above-mentioned mound excavated in 2000 in the southeast, containing multiple phases, was situated close by two other large mounds and a large building, House 150 (Løken 1997, 2001, 2006; Gil 2016). In fact, House 150 is surrounded by three larger mounds. In the southwest, another large longhouse, House 2, is next to Mound 2 (fig. 5 a). Three of the mounds have large grave chambers. We can assume that the superimposed monuments and the large chambers were closely connected to the families occupying the largest houses. The location of houses and graves at Forsandmoen underlines the strong proximity between the living and the dead that we recognize from contemporary farm complexes. Although we are well familiar with this proximity from the farm complexes, the same practice seems strikingly inconvenient in a dense settlement twenty times the size of the single farm. The limited space between the buildings must have been tightly regulated. Although we do not have preserved traces of any kind of fence around the different farm units, the distribution of the cooking pits, most commonly located in smaller clusters outside the southwestern entrance of the main buildings, indicates an organised outdoor space (Dahl 2009).

New radiocarbon dates support the impression of two phases for House 2 adjacent to Mound 2. House 2a was in use in the Migration Period, at the same time as the chamber in the mound (Dahl 2019:63) (fig. 5 a and c). However, the radiocarbon dates from House 150 show use in the Early and Late Roman Iron Age, whereas the two identified burials in the mound are from the late Migration Period. We have to take into consideration that these two burials belong to the two last construction phases of the mound. We might have the same situation as in Mound 2, with the primary sequence constructed in Late Roman Iron Age, at the same time as House 150 was in use. A little cluster of houses close by, some of them in use in the Migration Period, should also be seen in relationship with the large mounds (fig. 5 c). At the same time, the continued use of the mound may still have been related to the abandoned House 150, commemorated and present as a significant ruin (Herschend 2009; Dahl 2016b).

Mound 2 was constructed on top of the eastern corner of House 10 (see fig. 1 b, 5 a and 5 b). Two of the phases of House 10 were in use in Late Roman Iron Age, and the primary phase of Mound 2 must have been built shortly after the abandonment of House 10a and 10b. It is tempting to suggest that the earliest phase of Mound 2 was constructed for inhabitants of House 10, at the foot of the house ruin. In the Merovingian Period new buildings were constructed on the same plots as House 10 and House 2 (Dahl 2019). In the Merovingian Period, the largest cluster of houses of the once large settlement is located next to Mound 2 (see Bjørdal 2016). While there are no identified burials from the Merovingian Period in Mound 2, only two sherds of soapstone, its proximity to the last remaining cluster of buildings implies that the mound still played an important role in the Merovingian Period mind-set (fig. 5 d). Mound 2 may have been considered as the dwelling for the predecessors. The affiliation to older monuments can be perceived both explicitly and judicially, as ownership of land, and as a more symbolic connection to ancestors (Dahl 2016b). The built environment of both houses and graves is thus conceived of as monuments of an outstanding past, at the same time present and entangled by being incorporated into later practices.

The constructions and the construction process

The exploration of the burials known from Forsandmoen place almost all of them within a short time frame of 300 years, compared to a settlement with a duration of 2200 years. More than just pinpointing a pattern, we have to look into possible reasons for the investment in building burial monuments and the largest houses during the Late Roman Iron Age and Migration Period. These are highly expansive periods in Rogaland that left massive material traces in the landscape (Myhre 1981:118–120). The largest monument at Forsandmoen is the 30-metre-long cairn in the south-east (fig. 5 a). The few objects found within the large monument, from a Late Roman Iron Age / Migration Period cremation burial (tab. 1), reveal a discrepancy between the mound and high status finds. A large mound does not indicate high status finds. This discrepancy was also prominent in the graves in Hålandsmarka, approximately 55 kilometres southwest of Forsandmoen (Dahl 2016a). Oddmunn Farbregd has pinpointed that a large grave monument demands common work effort and approval, while rich grave goods can be seen as a more short-lived demonstration of status during the funeral (Farbregd 1993:6). The ability to mobilize the local community indicates another form of power than the wealth necessary to furnish a rich burial.

Questions regarding the investment in building monuments in the Late Roman Iron Age and Migration Period unavoidably touch upon the archaeological interpretations of burial monuments. Burials are not seen as directly mirroring society, but more as its material arguments (Lillehammer 1996; Williams 2006). Large monuments may not necessarily indicate growth and prosperity, rather a need to argue and convince when power is under debate (Hedeager 1992; Löwenborg 2012). In this sense, the Late Roman Iron Age and Migration Period and the peak of the settlement at Forsandmoen can be characterized as times of larger disputes, where the display of power in the form of an investment in monuments was considered important. The discrepancy between the finds and the mounds demonstrate that the attention was directed towards the constructions and possibly also the process of constructing. This might also apply for the buildings.

The death of individuals with key roles could result in a dangerous interregnum with the potential to throw the society into stress and reorganisation of power. We can imagine the importance of the building of monuments as a communal grieving process with the local society occupied in conducting larger work efforts. Most probably the work was tightly directed and used as an opportunity to visualize, maintain or transform hierarchy. Such theatrical performances could interplay with the sense of stability, expressed through the continuous use of graves and buildings, creating the successful assurance of stability in a fast-growing community at Forsandmoen, as in the rest of the region.

Mound 1, 2 and the larger mounds in the southeast offer important insights into the care and attention directed towards building meticulous constructions for the dead. In Mound 1 the carefully constructed thin layers of turf and stones were covered by a large cairn, and in Mound 2 the half circular mound outlined by larger stones was sealed by a larger mound. Only the people that participated in the construction, or viewed the spectacle that we can assume every burial provided, shared this collective memory. However, the mounds made the past present and transformative. More than monumentality, the landscape was furnished by complex and layered constructions in Late Roman Iron Age and Migration Period.

The construction process appears to have been more important in the local community in the Late Roman Iron Age. Here we might be able to identify a change between the Late Roman Iron Age and the Migration Period. In the Late Roman Iron Age new monuments were constructed for new burials. Mound 1 illustrates that one mound could be constructed for several simultaneous burials at the transition between the Late Roman Iron Age and Migration Period. The large chambers appear to have been in use throughout the Migration Period (Næss 1996; Kristoffersen and Oestigaard 2008; Dahl 2016a; Fredriksen and Kristoffersen 2020). The shift represents a significant difference in the way societies in the past faced death, from the massive work effort of building large constructions at the time of death, to incorporating the dead into an already existing monument. The same pattern could be identified in Hålandsmarka where meticulously constructed burial monuments from the Late Roman Iron Age were crowned by a large chamber containing at least four inhumations and cremations from throughout the Migration Period (Dahl 2016a). In Mälardalen in Sweden both the over- and underlaying graves were from the same century within the Migration Period (Stenholm 2006:343). Hence the Migration Period material from Rogaland and Mälardalen can be seen as marking the beginning of long-lasting practices of monument reuse seen as a strategy in Western Europe from the Migration Period and throughout the Late Iron Age (Williams 1997:1; Stenholm 2012:10).

We can imagine how material culture gained more attention during larger transformations in society. As mentioned in the introduction, the important role material culture plays in enabling remembering and in upholding the past was earlier underrated (Williams 2006:3; Olsen 2010:110). Regarding material culture and transformations, the investment in building new monuments in the Late Roman Iron Age might point towards larger social changes starting far earlier than the discussed break at the end of the Migration Period (Løken 1988; Dahl 2009, 2016b). The burial practice in the Late Roman Iron Age could further hint at the necessity to direct more archaeological attention towards the act of constructing material culture. The burial practices in the Migration Period can be seen as examples of acts to revitalise the past, to underline the repeated use of things to enhance a sense of continuity. The change also causes less variation in the burial practice (Fredriksen and Kristoffersen 2020), a phenomenon also seen in the standardised construction principles of houses from the same period (Løken 1983, 1987, 1999, 2001; Gil 2016).

Conclusion

A major goal of pre-development excavations is to generate new questions and insights into previous excavations and finds. The excavations offer both unique and repeated possibilities to challenge our perspectives on past, present and future practices. A multitemporal approach can bring more attention to construction processes and other practices demonstrating the repeated use and transformation of the built environment (Dahl 2016a and b). Challenging the traditional approach to graves as containers of a single burial event allows us to explore possible variations over time. The mounds excavated at Forsandmoen in 2017 offer important insights into the care and attention directed towards building meticulous constructions for the dead. Several superimposed monuments imply that Late Roman Iron Age society invested in building new mounds for new burials. The large grave chambers appear to have been in use for several burials throughout the Migration Period. The shift represents a difference in the way past societies faced death, from the massive work effort in building large constructions at the time of death to incorporating the dead into an already existing monument (Dahl 2016a). It is reasonable to believe that the explanation can be sought in the construction process itself and the central role it may have played in a fast-growing society. Repeated use of the present monuments in the Migration Period underlines that reuse and the multitemporal should be expected when investigating material culture.

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The elite settlement at Ströja, Eastern Sweden, AD 450–1000

Björn Hjulström and Marta Lindeberg

Abstract

The results and the large scale of the excavation of a mead-hall and surrounding activities makes Ströja in Östergötland, Sweden, a vital piece in the puzzle of how the elite during approximately the 5th to 10th centuries in Scandinavia organised their world. Throughout the history of the settlement there are tangible pointers to how the lords of Ströja tried to empower the settlement and to consolidate that power. This can be seen in architecture, in the market area, and in the ritual activities and feasts that were held. This article presents a summary of the excavation results, examines how the settlement changed over time, compares Ströja with similar sites and discusses the driving forces behind the events at Ströja.

Keywords: Central place, mead-halls, market place, human sacrifice, Germanic Iron Age, Viking Age

Introduction

Large-scale excavations at Ströja, in Östergötland, Sweden, carried out in 2011, 2012, 2016 and 2020, have unearthed a previously unknown central place with an elite farm, a market area and a hamlet. This is a preliminary presentation of the excavation results of the remains and stratified layers that show Ströja's significance as a central place in c. AD 450–1000. Ströja is situated on the Malmölandet peninsula in the north-eastern part of the Swedish province Östergötland ("Land of the Eastern Götar/Geats"), just north of the modern town of Norrköping (fig. 1). The settlement was on a low ridge that runs along the western shore of the peninsula. Östergötland is recognized as a central region in eastern Scandinavia during the 1st millennium AD (e.g., Nordén 1929, 1943; Nerman 1958; Ramqvist 1991; Kaliff 1999, 2001; Rundkvist 2011), although only few elite settlements have been identified.

In this paper, we will give a presentation of Ströja, from its establishment in c. 450 until its significance diminished in c. 1000. To better understand Ströja's status during the period c. 450–1000 we will compare Ströja to similar sites, such as Tissø, Lejre and Järrestad. This is followed by a discussion of the driving forces behind Ströja and the changes that took place over time.

Ströja AD 450–650

Mead-halls and other buildings

The first and most prominent event at Ströja was the construction of a mead-hall (house 24a) in c. 450 (fig 13.2). The building burned down and was replaced by an almost identical mead-hall (house 24b) in the same place. It has not been possible to determine when house 24b was built, but it stood until c. 600/650.

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Figure 1. Ströja was located close to important land and sea routes just north of the present-day town of Norrköping in the eastern part of the province Östergötland. The map shows the vital land and sea routes as well as some important contemporaneous sites, such as Borg and Ringstad. Illustration: Björn Hjulström and Marta Lindeberg.

Both mead-halls were three-aisled longhouses with convex walls. House 24a was c. 38 metres long and up to 8,5 metres wide, and house 24b was 42 metres long and up to 10 metres wide. There were 7–8 trestles and the trestle-width varied from 2.7 metres at the gables to 4 metres at the centre of the house. The roof-bearing posts closest to the gables were not placed in line with the rest but stood closer to the corners (type Corner 2) (Ulväng 1992:35). There was a stone wall around the western gable, a feature that is unparalleled in the region. The house was on a ridge, making it visible in an otherwise rather flat landscape.

The artefacts from these early mead-halls were not exceptional, and fragments of a green Snartemo beaker were the only artefact that suggested its status. Another interesting find was an iron spiral. There was a rectangular clay plate, attached to a hearth, at the centre of house 24b where a large concentration of henbane seeds was found. It was clear that the seeds had been collected, and deposited, near the plate on purpose.

The architecture of nearby houses 139 and 146, and their association to house 24, indicate that they were special purpose buildings. The houses stood perpendicular to, and close to, the mead-halls. House 139 was built in the same location as house 146 after it had been torn down. Both houses were smaller (c. 12 by 5 metres and 8 by 5 metres respectively) than the normal three-aisled houses at Ströja. Both houses had two roof-bearing trestles. Only the roof-bearing posts were preserved from house 146, whereas house 139 also had gable posts closer to the corners (type corner 2) (Ulväng 1992:35) and a wall-trench with wall-posts on the inside. The finds from house 139 consisted of loom weights but there was also a beautiful elliptic strike-a-light stone.

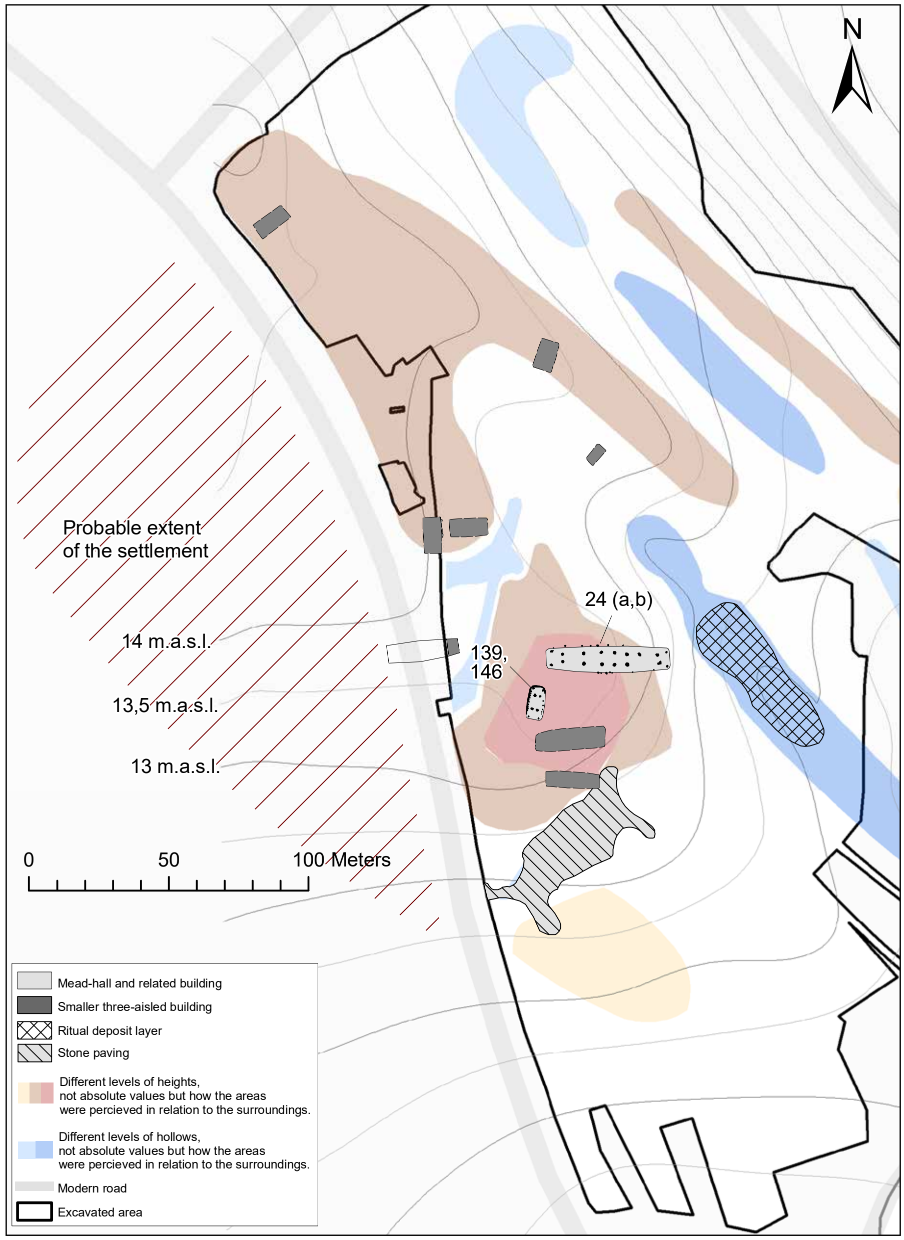

Figure 2. The settlement at Ströja c. AD 450–650. The excavated area covered c. 50.000 m². Close to the mead-hall was a probable cult-house and a few three-aisled houses. The post-setting from houses 24b and 139 are shown. Activities connected to the ritual waste layer in a depression east of the mead-hall seems to have started at the same time as the mead-hall was erected. Ströja was located on a ridge that ran in a north-south direction. The western part of the excavated area was located on the ridge and the rest of the area was situated on a gentle eastward slope. There were, however, several smaller heights (marked beige) and shallows (marked blue) within this area. The settlement has been delimited to the north, east and south. Our estimation of the settlements westward extent is also shown in the plan. Illustration: Björn Hjulström and Marta Lindeberg.

A few three-aisled buildings of ordinary dimensions were found in the vicinity of the mead-hall. These were c. 14–25 metres in length and 6–7 metres wide. South of the mead-hall there was a large stone paving (60 by 25 metres) placed in a natural depression. The stone paving has not been dated yet, but stratigraphically it seems to pre-date the 8th century.

Layers with fire-cracked stones and animal bones

In a natural depression, east of the mead-hall, there was a large deposition (measuring 20 by 60 metres, and up to 0.5 metres thick) of fire-cracked stones and unburnt bones. The material was continuously accumulated from the 5th century up to about the 9th century.

A sizeable osteological material was recovered from the layer in the depression. The dominant species were cattle (c. 70%) followed by pig (9%), goat/sheep (7%) and horse (4%) (Jonsson *in prep*.; Flood *in prep*.). The remaining 10% of the osteological material came from several different species of fish (e.g., pike, carp, sea urchin, trout, and perch), game (e.g., wolf, deer, elk, fox, hare, beaver, and otter) and bird (e.g., chicken, anseriformes, eagle, goose, swan, and magpie). Almost 80% of the cattle bones came from meat-bearing parts. This distribution was almost the opposite to horse, pig, and sheep/goat, where crania or phalanges amounted to over 80% of the bones. Some of the bones were violently hacked with repetitive chop marks in a way that does not correspond to normal butchery traditions. This type of chop mark has been identified on bones from cattle, horse, and wolf so far.

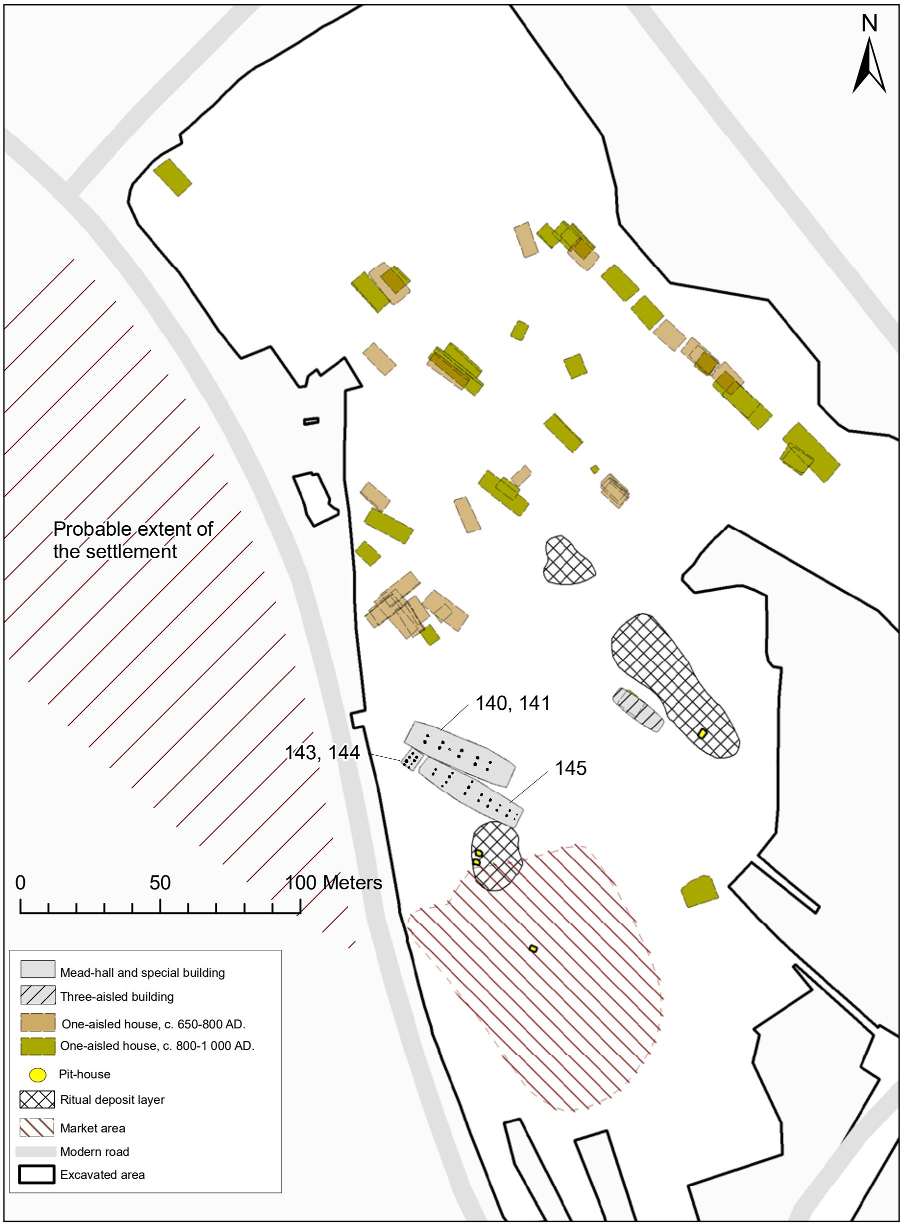

Figure 3. The settlement at Ströja c. AD 650 – 1000. In c. AD 650 there was a reorganization of the settlement. The mead-hall was relocated and the direction of all the houses shifted. The post-setting of mead-hall 141 and 145 and house 143 are shown. One of the most obvious changes was the establishment of a market place south of the mead-hall. The large ritual waste layer was still in use, but similar material was at this point also deposited at two other locations. Instead of three-aisled houses relating to the mead-hall there were now several smaller farms and/or concentrations of houses. These smaller buildings were mainly one-aisled houses. Illustration: Björn Hjulström and Marta Lindeberg.

Ströja c. AD 650 – 1000

There was a complete reorganization of the settlement in c. 650 (fig. 3). The most obvious changes were the relocation of the mead-hall, the establishment of a market place and the emergence of a village. The mead-hall was still the focal point, and the depositions of fire-cracked stones and unburnt animal bones continued.

Mead-halls, possible cult-house and ritual deposits

At the time of the reorganization in c. AD 600–650, a new mead-hall was built c. 20 metres south-west of mead-hall 24. At some stage, house 140 was torn down and was subsequently replaced by a similar building in the same place (house 141).

The two buildings had very similar post-settings. Both were c. 35 metres by 10 metres in size and had slightly curved walls. The post-setting differed from the earlier mead-halls. There were 5–6 trestles, and the trestle-width was narrower (c. 2–2.6 metres). A ditch was dug around house 140 which was backfilled when house 141 was built, and a low stone wall was constructed around the western gable. A stone paving of fire-cracked stones surrounded the western gable.

Among the prominent finds from the mead-halls were five gold foil figures (2 stamped and 3 cut fragments). Four were found in a layer above one of the roof-supporting post-holes and the fifth was found in the ditch surrounding the building in the first phase.

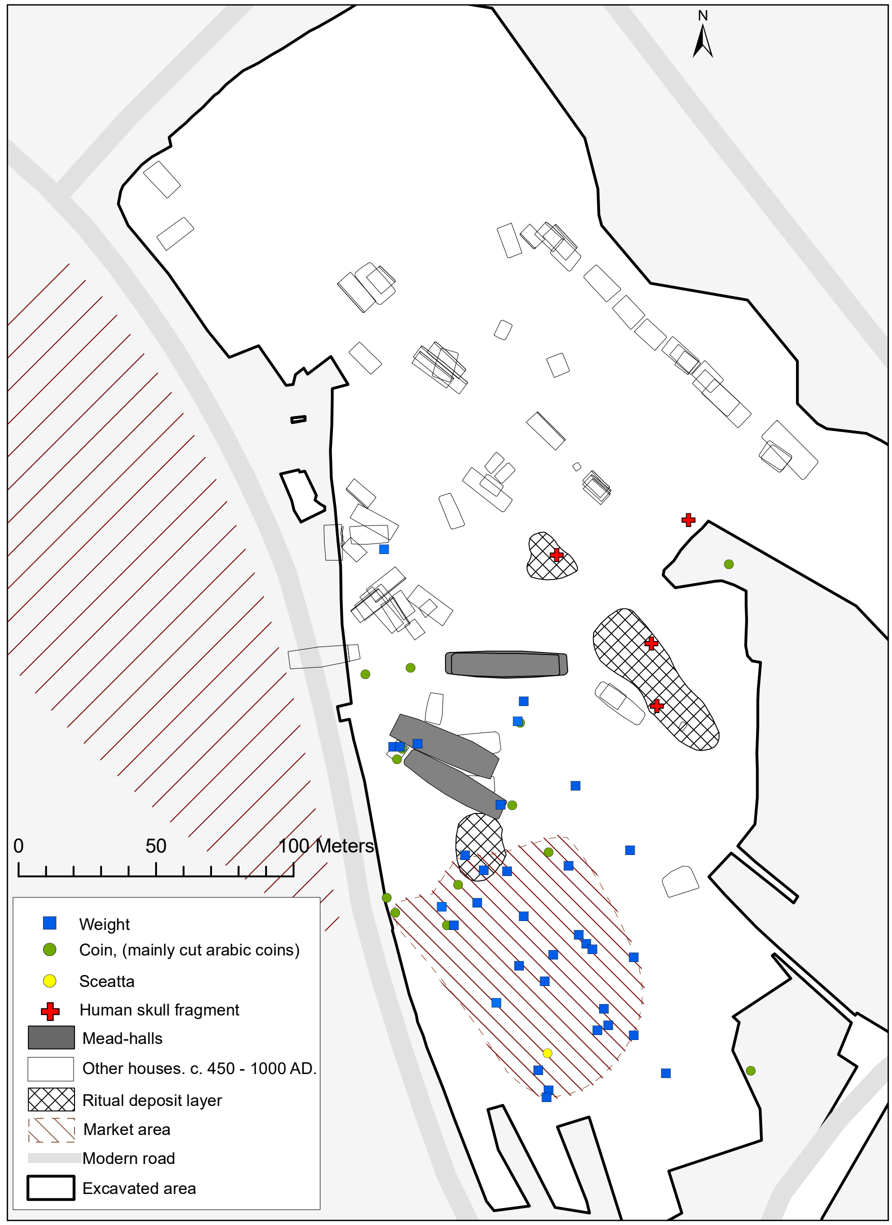

Figure 4. Plan of finds indicative of trade, such as coins and weights. These were somewhat concentrated to the market area south of the mead-hall. Significant for the market area was the large find material and the fairly large number of small postholes. The four human skull fragments are also shown. Three fragments were recovered in ritual waste layers and a fourth fragment was found above a hearth. Illustration: Björn Hjulström and Marta Lindeberg.

A third mead-hall (house 145, c. 40 × 10 metres) was situated just south of mead-hall 140, and in the same alignment. This building possibly represents a third phase of the mead-halls. Fragments from a globular beaker were deposited in three postholes in the western part of the building; in one of these, there was also a gold spiral (Sw. *betalguld*). The glass recovered in connection with the large buildings is exceptional and consists of fragments from 19 different glass beakers (Haggrén *in prep*.).

A small three-aisled house (house 143) was positioned perpendicular to mead-hall 140, just south of the western gable. When house 143 was torn down it was replaced by a new house in the same location (house 144). If they were contemporary the northern gable of the smaller houses would have touched the walls of the mead-halls, the buildings could even have been attached. These smaller houses were c. 6 by 5 metres. Albeit their small size, both houses had big postholes which are evidence of sturdy posts.

As mentioned above, the fire-cracked stones and bones in the large ritual deposit layer continued to accumulate until about the 9th century. The number of artefacts recovered in the layer was comparatively low but a deposition of miniature weapons (a sword, a spearhead, and a shield) stands out. Similar material was also deposited at two other places (fig. 3). These smaller ritual layers were in use from c. AD 700 to 1000. Fragments from four unburnt human skulls were found in relation to these layers.

The market area

South of the mead-halls was an area that we interpret as a market place. A large number of detector finds show that the market activities took place in a c. 70 × 100 metre area. Several of the finds were of very fine quality (e.g., different clasps, fittings, and buckles), although in general not as exceptional as the finds from the vicinity of the halls.

Many of the finds from the market area were indicative of trade (e.g., weights and silver coins) which set the area apart from the rest of the settlement (fig. 4). The coins were predominantly Arabian, recovered both as whole coins and as cuts. Remarkably, a Frisian sceatta (from about the first half of the 8th century) was recovered. The sceatta had a drilled hole and had been used as a pendant.

The excavation of the market area was frustrating in that, although there were concentrations of postholes, it was not possible to identify any buildings. The only definite buildings were three small sunken floor huts and two rather solitarily placed houses east of the market area.

The above-mentioned large stone paving may belong to the earliest phase of the market place. This would give a better understanding of the stone-packing as a reinforcement of the shallow between the large buildings and the market place.

The hamlet

At the same time as the market place emerged, Ströja changed from an elite farm into a village-like settlement, with 5–7 small farms east and north of the mead-hall. There was also a row of houses in the north-east. The buildings in the hamlet were mainly one-aisled houses, c. 6–8 by 5 metres in size. There were also larger hybrid houses (c. 10–20 × 5 metres), which combined three-aisled, two-aisled, and one-aisled constructions.

Ströja c. AD 1000 – 1300

Around the late 10th century trade and ritual activities declined. There was, however, no discontinuation of the settlement. Ströja was still the seat of a wealthy landowner, with a village that consisted of several farms. Elements of an upscale farm at Ströja can be traced in the archaeological material up to the 13th century through finds such as spurs, surgical instruments, book clasps, continental ceramics, and a stylus. There was also a large framework building (26 by 10 metres) from this period. Written records show that the landowners during the 14th century belonged to some of the most prominent families in the country. By this stage, the nine farms were equal in size and were managed by leasing farmers.

Artefacts, DNA and archaeobotany

Artefacts

The find material from Ströja was substantial. The registration of finds from 2020 is not yet completed, but there are more than 17.000 find posts. The bulk consists of nails and horseshoe nails, and a portion of the finds belongs to the period after the 17th century but among the rest there is a considerable number of interesting finds. In general, the finds were dispersed all over the area but with concentrations on the ridge around the halls and the market place. The most exclusive finds were recovered close to the mead-halls.

The finds represent many different aspects of Iron Age life: warfare and hunting (e.g., shield rivets, pommels, chape, arrowheads, quiver, spears, horse gear and possibly parts of a helmet), household activities (e.g., knives, needles, keys and ceramics), crafts (e.g., spindle whorls, needles, spoon augers and chisels), personal items (e.g., clasps, buckles and surgical instruments) and finds of ritual importance (e.g., miniature weapons, gold foils, amulets). Some of the more exclusive finds are shown in figure 5.

There was a distinct military presence seen in the material, especially from the period after AD 650. Several of the artefacts were associated with the elite by being of very high quality with, for example, gold plating and animal art.

A large number of shards from glass vessels was found. Most of the glass was recovered around house 140 and 141, but also from other contexts. The colours of the glass ranged from translucent to different yellowish-green-brown tones, and light and dark blues. 17 claw beakers, three globular beakers (squat jars), two Snartemo beakers, a bag beaker, a funnel cup and a possible bell beaker have been recovered. There are also at least six additional unidentified beakers (Haggrén *in prep.*).

Human bones and DNA-analysis

Four fragments from human skulls were found in, or close to, the ritual waste deposits (fig. 4). The burial custom at the time was cremation and these four individuals had received very different treatment. The radiocarbon analyses show that they may have died on the same occasion around AD 770. It is, however, just as likely that the skulls originate from a short period in the 8th century.

The four skull fragments have been analysed in collaboration with the Atlas project, a large study of prehistoric DNA at Stockholm university. It was possible to extract DNA from two of the four individuals. Both were female and their genetic profiles differed from most contemporaneous Scandinavians analysed so far (Götherström and Rodrigues Varela *in prep.*).

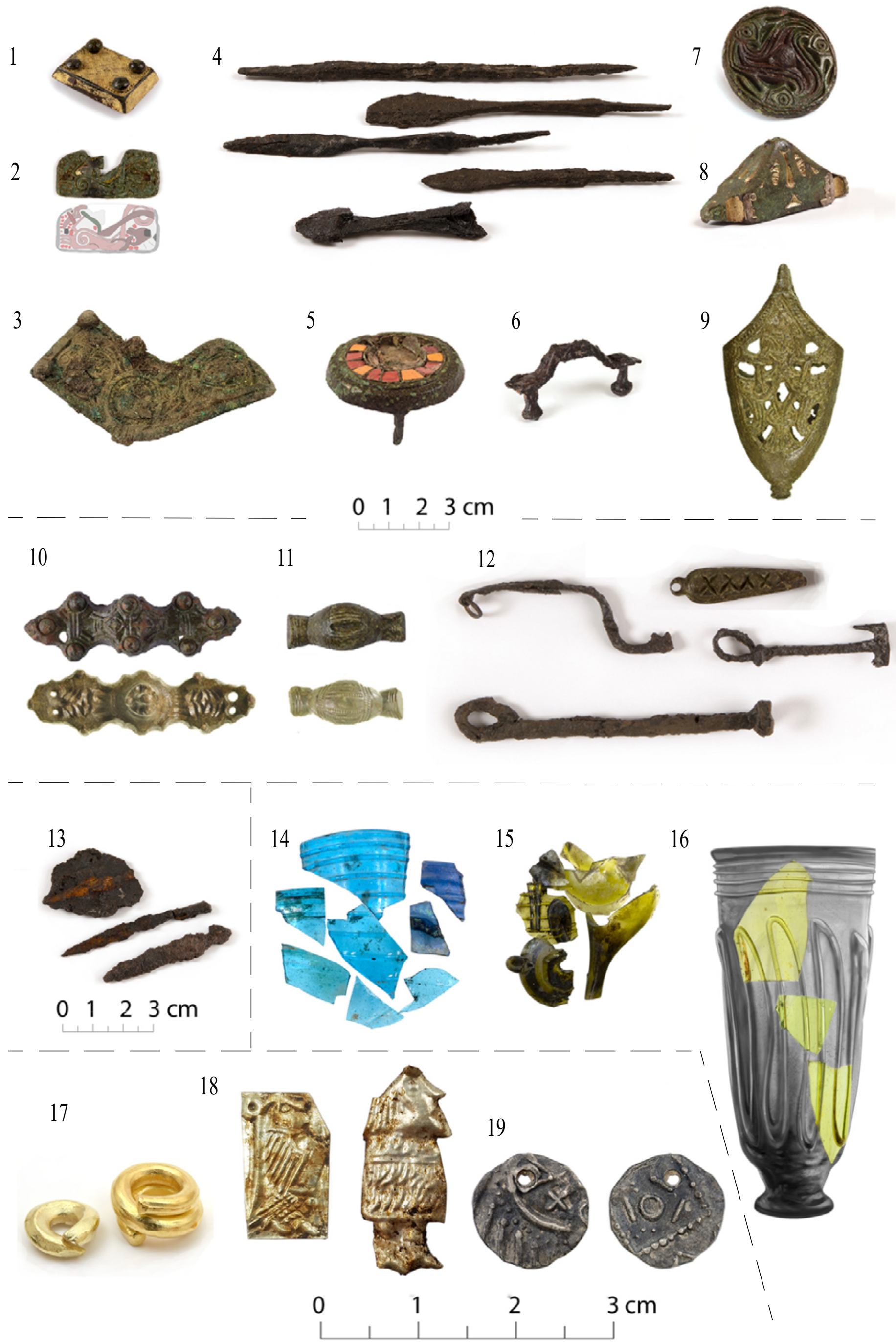

Figure 5. Selection of finds from Ströja. The top section shows finds belonging to the martial and the elite sphere: 1 – Gold gilded belt or strap fitting, 2 – Gold gilded belt or sheath fitting, 3 – Gold gilded fitting from horse harness, 4 – Arrowheads, 5 - Disc brooch, 6 – Closed quiver mount, 7 – Rivet, probably from the rim of a shield boss. Wood from the rivet showed that the shield was made of ash, 8 – Sword pommel, 9 – Sword chape. The section below shows finds from the settlement: 10 – Equal-armed brooches, 11 – Small equal-armed brooches, 12 – Keys. 13 – Miniature weapons: a spear head, a sword and probable part of a shield, that were deposited together in the ritual waste layer. The glass section shows three beakers: 14 – Shards from a blue claw beaker, 15 – Shards from a green claw beaker, 16 – Reconstruction of the Snartemo beaker. The bottom section shows special finds from the area around the mead-hall and a special coin from the market-area: 17 – Gold spirals (Sw. betalguld), 18 – Gold foils, 19 – Sceatta. Illustration: Björn Hjulström and Marta Lindeberg.

Archaeobotany

The results from the archaeobotanical analyses regarding cultivation systems, beer brewing and crop selection are of special interest. Hulled barley constituted the main crop, but the cereal cultivation was diverse, and wheat, rye and oats were grown right from the establishment of the settlement. The composition of weed seeds suggests a cultivation system where hulled barley was planted in spring and rye in autumn. This type of cultivation system meant that it was possible to get two harvests every year. Notably, wheat was more common than hulled barley in some of the houses on the ridge (Gustafsson 2001, Gustafsson *in prep*.).

There were ample traces of beer brewing. A pollen analysis from a 7th century well showed concentrations of hop, sweet gale and meadowsweet (beer grass). Even more convincing evidence for brewing was a large amount of charred malted hulled barley found in a ditch close to the later hall buildings (Gustafsson *in prep*.).

The barley grains recovered from the mead-hall were large, which suggests that the grains had undergone a selection process. Similar grain selection is evident at Uppåkra and other elite-settlements, and the pattern indicates that the high-quality barley was intended for specific households or individuals (Larsson 2017:419). It is likely that the crop selection of barley is another sign of beer production. When brewing beer, it is advisable to use grains of similar size, preferable large.

Discussion

Comparative outlook

Comparable central elite settlements are, for example, Slöinge, Helgö, Västra Vång and Järrestad in Sweden and Gudme, Lejre, Tissø and Strøby in Denmark.

Ströja – a central place

The German geographer Walter Christaller, who introduced the central-place theory, defined it primarily as a place for the offering of goods and rendering of services (Christaller 1933:20). The concept has been necessarily broadened to be applicable to north European societies in the 1st millennium (e.g., Larsson and Hårdh 2002; Fabech and Ringtved 1999; Ludowici *et al.* 2010 with references). Several of the functions that can be attributed to central places, such as administration, religion, trade and manufacture, are reflected in the archaeological material from Ströja. The assemblies with cultic functions, of interest to a larger population and not only the inhabitants at Ströja, are visible in the ritual waste layers. Trade is evident in the market place from the period c. AD 650–900. Political and judicial functions are associated with the mead-halls, although this connection is an assumption based on what we ascribe to the mead-hall concept. Hence, Ströja falls in line with the above-mentioned sites.

Another function we want to emphasize is the military aspect. To maintain all the diverse activities at a site such as Ströja it would have been necessary to guarantee peace (cf. Skre 2007:450–452). The martial aspect at Ströja is, difficult to substantiate, since the evidence consists of finds rather than structures. However, several finds of high-status weaponry are evidence of a substantial martial presence.

Location

Ströja was located close to important intersecting land and sea routes (fig. 1) and could therefore access and control these routes. Consequently, the settlement functioned as a gateway, and checkpoint, for travelers on their way to and from the central regions of Östergötland. This was obviously already of importance early in Ströjas initial phase as a central place, but possibly even more so during the later phase, with the establishment of the market place and the emergence of a sea-based society. As it is more or less a prerequisite for a central place to be located close to important routes, it is no surprise that this is something that Ströja has in common with all the comparable sites.

The location was excellent regarding production value, and Ströja could provide for a substantial population. The fields in this area are famously fertile and high-yielding, and the low-lying clayey areas provided good pasture. Another important asset was the sea. Fish from the Baltic constituted an important food source. The vast Kolmården forest with resources such as wood and game lay within easy reach. Osteological and archaeobotanical analyses have shown that all these resources were utilized.

From a defensive aspect, the location of Ströja was not optimal. The local topography did not offer any specific military advantages, and the proximity to land and sea routes made Ströja vulnerable to attacks. However, its position, with direct access to the Baltic Sea, made it optimal as a meeting point for a fleet.

Mead-hall

The hall, or mead-hall, is probably the most renowned building category from the Iron Age, and for good reason, since it is repeatedly alluded to both in the Norse sagas and in the Saxon and Anglo-Saxon skaldic poetry (see Thompson 1995; Brink 1996; Enright 1996; Herschend 1997, 1998). The hall was a building, or room, where the lord would entertain prominent guests in order to negotiate and legitimate his power. It was also a place for settling legal matters and for religious activities (Dillmann 1997; Herschend 1997; Larsson 2006; Sundqvist 2006, 2016, Carstens 2015). That a building constitutes a mead-hall is not always obvious in the archaeological material, since our definitions today do not equate with the thinking of those who erected the hall.

The size and the placement of houses 140, 141 and 145, from the phase c. 650–1000, together with related finds, clearly define the buildings as mead-halls. Houses 24a and 24b, from the phase AD 450–650, were larger than the ordinary buildings, but the find-material was not overwhelming. To our minds, the architecture, and the placement of the halls itself, would classify the buildings as mead-halls. Finds that support this interpretation are a Snartemo beaker and an iron spiral. Similar iron spirals have been found at mead-halls at the royal site Gamla Uppsala (Ljungkvist and Frölund 2015:20), but to our knowledge not in any ordinary dwelling houses. The concentration of henbane in house 24 also invokes some imaginative interpretations. Henbane has narcotic properties and was used in *seið* as well as for medical purposes (Price 2002:205; Heimdahl 2009:113), which fits well in the context of a mead-hall.

Complementing buildings

The layout at Ströja, with the large hall in an east-west alignment and a smaller house placed perpendicular to its western gable, can be seen at several comparable sites: Tissø (Jørgensen 1998:236–327), Järrestad (Söderberg 2005:77), Erritsø (Mohr Christensen 2009:4) and Lejre (Phase 2 and 3 at Mysselhöjgård) (Christensen 2015:85). The associated small houses have been attributed to sleeping quarters for the lord (Christensen 2015:126) as well as to cultic or ceremonial functions (e.g., Andrén 2002:315–316). Regardless of their function the similar layout suggests that the same idea lay behind the construction at Ströja.

Communal feasting and associated rituals

The large deposit with fire-cracked stones and animal bones in Ströja was in use probably during the 5th –9th centuries while the smaller layers were accumulated probably during the 8th–11th centuries. Layers with fire-cracked stones have been recognized at several other elite farms, such as Lejre (Christensen 1991:55–56), Strøby/Toftegård (Tornbjerg 1998:225), Husby-Glanshammar (Ekman 1998:1) and Järrestad (Söderberg 2005:79). In contrast to Ströja, animal bones are often absent in the layers with fire-cracked stones at these other sites. These layers have nonetheless been associated with food-preparation at "vezlu-halls"—that is, halls connected to feasting and ritual meals (Brink 1999:13; Söderberg 2003:298). For lack of a better definition, we have described the layers at Ströja as ritual waste deposits.

We argue that the differences in the distribution of the meat-bearing parts of domestic species are signs of sacrificial activities. The bones that show repeated chop marks are interpreted as bearing traces of high intensity butchery practices that took place in connection with communal events (cf. Stolle 2020:193f). Similar practices have been identified at nearby Borg and at Helgö (Lindeblad and Nielsen 1997; Stolle 2020).

Human bones have been found at other similar sites, but the four human skulls from ritual contexts are unique. The absence of the rest of the bodies and the fact that the skulls had not been cremated suggest that these individuals were killed, possibly as a sacrifice or as a punishment.

The large quantities of fire-cracked stones and the fact that the stones were placed in the ritual waste deposits lead us to believe that the stones themselves held special significance. Rather than simply being the refuse from food preparation, we believe that the fire-cracked stones are primarily waste from beer brewing (cf. Sundt 1856; Grønnesby 2014). As beer was an essential component in the ritual feastings, it became apposite to deposit the waste in the ritual waste layers.

Cultivation

Cereal cultivation at Ströja shows great similarities to the cultivation systems at large farms in Scania and Denmark from the same period (Gustafsson *in prep.*). It is likely that rye cultivation with two yearly harvests from the same field was introduced at Ströja during the 5th century. It has long been assumed that this system was introduced much later in Östergötland (Myrdal *et. al.* 1998:324–330). The cultivation system's early introduction at Ströja is likely a result of its role in top-level networks where interconnected elite farms exchanged goods and ideas over large distances.

Market place

The market area was primarily identified through the finds. There was a large number of postholes with no obvious internal relationships, and three pit-houses. Similar descriptions are given of the market areas in Tissø and Ribe during the 8th century (Thomsen 1993:71, 81; Müller-Wille and Tummuscheit 2004: 29; Jørgensen 2010:280). The archaeological remains at Ströja probably represent different kinds of temporary huts, booths and tents.

A long row of houses in the north-east can be interpreted as the same type of seasonally occupied houses that are found on assembly sites in Iceland and Norway (e.g., Sanmark 2017:132–133, 170–172).

Ströja, why and by whom?

The extensive results from a previously unknown site of such dignity as Ströja should greatly improve our understanding of social organisation in the Late Iron Age, and to enforce at least a partial revaluation of what we know about the Late Iron Age in Östergötland. At the same time, caution is important; we must not overestimate the significance of one place. This is particularly important considering that no similar site has been excavated in Östergötland. That said, we will now try to account for what happened at Ströja from two basic perspectives: why did these developments take place and who was responsible?

The start, AD 450–650

From its swift establishment around 450, it is obvious that the people who founded Ströja arrived as powerful players in the region and with great ambitions. The setting was an important factor in this. The possibility of monitoring important routes tells us that the founders aspired to control a fairly large area. So, who was the mastermind behind all this? A local ruler from Östergötland or an ambitious chief from neighbouring regions such as Svealand, Gotland or perhaps a south Scandinavian lord?

One way to approach the question of the origins of the founders is to look at the architecture. The mead-halls and their monumentality were not only expressions of power. The hall architecture was also an important expression of identity and a marker of affiliation. The architecture of the Ströja mead-halls from AD 450–650 shows traits that set them apart from other known mead-halls from the same period in southern Scandinavia and in Svealand. They had unusually wide trestle-widths in comparison to contemporary mead-halls in Svealand. For example, the 5th-6th century mead-hall at Lunda, Södermanland, had a trestle width of 2.4–2.8 metres (Beronius Jörpeland *et al.* 2003:213). Conversely, the Ströja mead-halls had gable constructions not generally used in southern Scandinavia. The hall (house II) at Fredshøj (Lejre) from the 6th century had a somewhat comparable post-setting, but was narrower, and had a ditch surrounding the building (Christensen 2015:60). So, we can see both similarities and differences from neighbouring areas. Instead of interpreting this as diffusion between two building traditions, we see the architecture as an intentional way of expressing the identity of its owner. Therefore, we suggest that the founders came from Östergötland.

But who were they? Was it an ambitious local chief who aspired to more power, or was it an older dynasty with its main domains in other parts of Östergötland that moved in? As has been emphasized, the location was perfect for controlling the surrounding region and important routes, but the topography also made the settlement exposed to intruders. An attack could come quickly, and the site held no obvious defensive advantages. To put all resources in such a place seems ill-advised, or perhaps just bold, and could imply that the overlord had his base elsewhere. In this scenario Ströja was founded by an existing dynasty who wanted to expand its power in the region. As to whether this can be understood in terms of a tribute system, direct operation, or a combination of these two (cf. Jørgensen 2001:282:283, see Frölund this volume), it is too early to answer.

Perhaps the lack of large grave monuments in the vicinity is an indication that the lord did not consider Ströja his main residence. If this line of argument is correct, then the leading family at Ströja would have been buried elsewhere, at their main residence. It could, however, just as well be that the elite at Ströja expressed their status through extravagant buildings, rather than monumental mounds.

The reorganization, c. AD 650 – 1000

After the reorganization beginning around 650 the most important new feature was the market place. This should be seen in the light of the increasing significance of sea voyages during the 8th century. Previously, Ströja had been the gateway for traffic to and through the region. Now it also became the starting point for voyages out of Östergötland.

The overlordship of Ströja may have shifted over time and a strong case for this can be made in relation to the major reorganisation in the mid-7th century. It is intriguing that one of the largest battles in the Saga material is said to have taken place at Bråvalla, close to Ströja. A lot can be said about the uncertainties and source-critical problems regarding both the battle itself and its location. We do, however, find it fascinating that the first identified elite warrior settlement in Östergötland is located very close to the place pinpointed as the battle ground, long before Ströja was discovered (e.g., Nordén 1916).

The architecture of the Ströja mead-halls from this period displays similarities to mead-halls in surrounding areas in the Lake Mälaren region (Svealand) and at Aska, in Östergötland, the latter being the only other known hall building in Östergötland (Rundkvist and Viberg 2015; Rundkvist and Lindgren 2021). Contemporaneous hall buildings in Scania and Denmark differ from the Ströja mead-halls. From c. 9th century they have a construction with supporting exterior buttresses (*Trelleborgshus*). The 8th century hall at Mysselhöjgård (Lejre house XL) (Christensen 2016:70) shows some similarities but the trestle-width is more than a metre wider than the contemporaneous halls at Ströja. So the architecture of the later mead-halls has equivalents in Östergötland and in Svealand, but deviates from the south Scandinavian halls.

The sacrificed humans, whose skull fragments were found close to the ritual waste layers, lend credence to the view that Ströja functioned as an important cultic site. They also invite some intriguing thoughts on the ideas behind this. In Viking Age Scandinavian society, the capture and trading of slaves were fundamental parts of the economy (Brink 2012; Raffield 2019). One interpretation is that the two women with deviating genetic profiles found at Ströja were taken on raids in the eastern or southern Baltic areas. The ship burials at Salme in Estonia (c. AD 700–750) confirm that Scandinavian warriors navigated the eastern Baltic shores during the pre-Viking period (Price *et. al.* 2016:1032–1036). Ströja would have been an excellent starting point for raids over the Baltic Sea. It is possible that the human remains at Ströja are testimonials to these pre-Viking or early Viking Age raids over the Baltic Sea, where the capture of slaves was an essential component.

The 11th –12th centuries: The fall from grace

Ströja lost its importance in trade, military strength, and as a religious centre during the 11th century. The emergence of Norrköping (Jonsson 2015; Bertheau 2018; Låås 2018) coincides with the decline of Ströja, and we would argue that activities connected to trade and political power were relocated to Norrköping. Perhaps the passage over Motala Ström in Norrköping had become permanent and secure, and as Norrköping became an all-year trading post, a *köping*, the seasonal marketplace at Ströja became redundant. At the former mouth of the river is Ledungshammar (see fig. 1), a name which suggests that it was the gathering place for the fleet (the *ledung* was a form of conscription to man coastal fleets for defence and/or seasonal raids). Nothing is known archaeologically about Ledungshammar, but it is possible that the site replaced Ströja as the place where the fleet mustered. This was also the time when large-scale ritual activities came to an end at Ströja. One reason for this could be the growing influence of Christianity, another could be the general loss of centrality of Ströja, or perhaps it was a combination of the two.

Summary

The excavation at Ströja, Östergötland, Sweden, has revealed a previously unknown central place that was of the utmost importance in the region during the period from the mid-5th to the 11th century. We can see that in the early 5th century, the site where Ströja was to be established was partly forested, and partly used as pasture. Travellers that arrived at Ströja in the second half of the 5th century would have met a very different sight. They would have seen a large mead-hall surrounded by smaller three-aisled houses and possibly a cult house. If arriving at the right time of the year, they would have taken part in ritual feastings and been offered food and beer as part of annual gatherings. A visitor of rank, of the right affiliation, would have been invited into the mead-hall, to join the lord and his retainers to exchange gifts and to listen to the skalds and the *seiðr*.

Although we have not excavated the full extent of the settlement, we know that a visitor during the late 7th-11th century would have arrived at a transformed Ströja. At this point there was a market area south of the mead-hall that attracted both local and foreign traders. The mead-hall was still the most impressive building, but it had been moved and the alignment of all the houses had been altered. The settlement-area had expanded, and the complex now included several farms. Ströja was still a place for communal ritual feastings and, during a short period, around the 8th century, the ritual activities seem to have included human sacrifices.

Some generations later, during the 11th century, Ströja lost its importance as a general focal point. Instead, a wealthy landowner had his residence at Ströja, surrounded by smaller farms. During the 14th century the village of Ströja was still a part of an estate but was entirely made up of tenant farms.

The processing of data from the last excavation season in 2020 has just begun, but it is already evident that Ströja can be compared to other elite sites in Scandinavia. The development of Ströja from a chieftainly farmstead with cultic functions into a central complex with features such as a market place, a hamlet, and sanctuaries for larger cultic assemblies in the 7th century is comparable to what happened in many other central places in Scandinavia at the time. Ströja's decline in the 11th century, and the shift of its political, religious and trade functions to Norrköping, are also developments common to many of the central places of the later Iron Age. Therefore there is every reason to expect that Ströja will continue to reveal vital clues that will deepen our understanding of the organisation of Scandinavian society during a period of profound societal changes.

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Development of the medieval villages in Southern Finland

Tuuli Heinonen

Abstract

In the late Middle Ages, the settlement pattern in coastal Uusimaa, southern Finland, was based on Swedish-speaking small villages. It has been thought that most of these villages were founded by Swedish colonists who arrived in the region from the late 12th century onwards. However, based on place name evidence, there were also Finnish inhabitants in the area during this time, although their role in establishing the villages has not been discussed to an equal extent. As the number of excavated village sites has increased, it has now become possible to discuss the development of the villages in the region from new perspectives, as is done in this paper.

Based on archaeological material and place name evidence, both Finnish and Swedish-speaking people were involved in founding the historical villages in Uusimaa. In central Uusimaa, this seems to have first happened during the period of Swedish colonization, but there are notable differences between different parts of the region. In western Uusimaa, the historical villages may have been settled already during the Iron Age. Although many of the historical villages were settled by the late 13th century, based on archaeological evidence the pattern of more regulated village landscapes with several farms located on a shared plot was first established during the 15th century.

Keywords: Rural settlement, Villages, Iron Age, Middle Ages, Southern Finland

Introduction

Archaeologists have long debated when the first villages in the area of modern-day Finland were founded, and if the earlier settlements were located on the same sites as the later villages. To date, these questions have mainly been discussed based on archaeological material from the central Iron Age settlement areas in western Finland, especially Finland Proper, Satakunda, and Tavastia (fig. 1). However, the development of villages in southern Finland has not been studied to an equal extent. This is mainly because the settlement history of the region differs from that of western Finland and Tavastia. Still, the question of the development of its first villages is no less interesting.

In this paper, the development of the medieval villages in Uusimaa, the southernmost region of Finland, is discussed. The central question of this study is whether the villages of the region have their roots in the Iron Age (500 BC–AD 1150/1200), or if they were founded during the Middle Ages (AD 1150/1200–1523). Because of the settlement history of the region, another interesting question concerns whether the villages were founded by Swedish colonists who moved to the area from the 12th century onwards, or if Finnish-speaking groups were also involved in the process. A third question is whether the earliest settlement pattern in the medieval villages consisted of single farms, or – if there were

In *Complexity and dynamics. Settlement and landscape from the Bronze Age to the Renaissance in the Nordic Countries (1700 BC–AD 1600)*, M. Ødegaard and I. Ystgaard (eds.), pp. 201-210. Sidestone Press, Leiden.

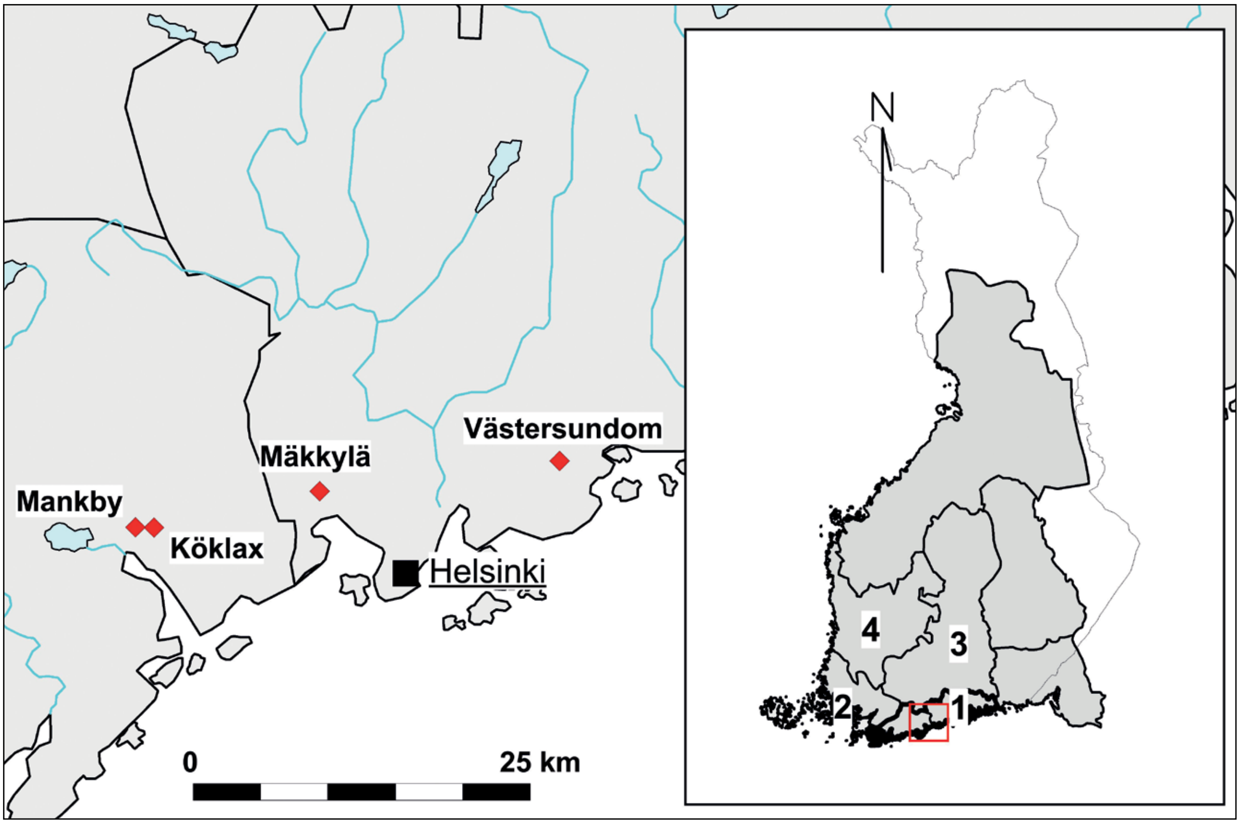

Figure 1. The four sites discussed in this paper and Finnish historical regions mentioned in the text: 1. Uusimaa 2. Finland Proper 3. Tavastia 4. Satakunda. Illustration: Tuuli Heinonen.

several farms – whether or not this might already allow the settlements to be characterized as villages.

These questions are discussed based on archaeological material gathered during field surveys and excavations in Uusimaa, mainly during the past two decades. As the first comprehensive written sources listing the villages in Finland date to the mid-16th century, archaeology has a central role in discussing the settlement development prior to this. The archaeological material discussed in this paper comes mainly from four extensively excavated medieval settlement sites located in central Uusimaa. In order to place the question of the settlement history of southern Finland in its larger context, the development of villages in western Finland and Tavastia is first discussed.

Development of the first villages in western Finland and Tavastia

In Finland Proper, Satakunda and Tavastia, there are several known cases where medieval village sites were already settled during the Late Iron Age (e.g., Vuorinen 2009:184; Raninen 2017). In some cases, the Iron Age settlements were located on the outskirts of the later medieval village, often in areas that were later cleared for cultivation (e.g., Lehtonen 2000; Tiilikkala 2016). In both types of cases, however, there is a clear continuation of the settlement from the Iron Age to the Middle Ages.

A more problematic question has been determining when the settlements developed from single farmsteads into villages with several farms. The usual Finnish definition for the term *village* (Fi. *kylä*, Sw. *by*) has typically followed the Scandinavian example, where a settlement with at least two farms engaged in regular cooperation on matters related to subsistence and the use of land is considered a village (Fallgren 1993; Schmidt Sabo 2001:51–54; Asplund 2008:33–37; Vuorinen 2009:202–206; see also Haue this volume; Ødegaard and Ystgaard this volume). As this definition puts more weight on the social rather than the spatial dimension of villages, it means that settlements that can be considered villages are not always easy to identify based on the archaeological material. Some farmsteads may have been located on separate plots even when they were engaged in cooperative efforts, while, on the other hand, two farms located relatively close to each other did not necessarily form a village. Sometimes it is even difficult to tell whether two excavated buildings belong to one or several farmsteads (Vuorinen 2009:206).

A further challenge facing the exploration of this topic in Finland has been that the number of Iron Age settlement sites that have been studied has remained quite small. Therefore, the study of Iron Age settlement development has typically been based on burial grounds (e.g., Tusa 1993; Salo 1995; Lehtonen 2000; Saloranta 2000; Nissinaho 2002, 2003). This poses several problems. The burial grounds do not necessarily represent the total Iron Age population, and as a result also likely do not represent the total extent of the overall settlement pattern (Pihlman 2004:81–82). It is also obviously difficult to examine the spatial organisation of farmsteads when settlement patterns are studied based almost solely on burials. However, as the Late Iron Age burial grounds were typically located quite close to the settlement sites, they do give some idea of the extent of settlement (Vuorinen 2000).

Despite these challenges, it has been suggested that the first villages in western Finland were founded already during the Late Iron Age, that is the Viking Age (AD 800–1015) and the Crusade Period (AD 1015–1150). During the Late Iron Age, larger cemeteries appear in the archaeological material. Based on the large number of burials, these were more likely used by small villages than single farms (Lehtosalo-Hilander 1982:53–57; Schauman-Lönnqvist 1988:92–96). On the other hand, there are cases where several contemporary Late Iron Age burial grounds are known from the area of a historical village. These have been thought to represent separate farms that formed the first phase of a village settlement (Tusa 1993; Lehtonen 2000; Nissinaho 2003:95–96).

Currently, the development from single farms into villages in western Finland is seen as a complex process that started during the Iron Age, most likely during the Early Viking Age. The development continued for centuries, and several types of settlements existed simultaneously during the process. Although there were some exceptionally large cemeteries, or concentrations of burial grounds, both possibly representing early villages, in many areas single farms likely remained the most common form of settlement until the medieval period (Saloranta 2000:34; Pihlman 2004). An interesting question is how the development of the first villages proceeded in Uusimaa, where, as has been noted, settlement history differed notably from western Finland and Tavastia.

The Iron Age and medieval settlement history of Uusimaa

Although Uusimaa was one of the central settlement areas in medieval Finland, the Iron Age settlement history of the region differs notably from that of the other central areas, such as Finland Proper or Tavastia. It was long thought that Uusimaa lacked any settlement during the Viking Age and Crusade Period (e.g., Hackmann 1917; Meinander 1983). This view was based on the archaeological evidence – or rather the lack of it. There are several burial grounds dating to the Migration Period (AD 400–600) and Merovingian Period (AD 600–800) in the region, especially in western Uusimaa, but the number of sites seems to drop drastically at the beginning of the Viking Age (Forsén and Moisanen 1995). This drop in the number of burial grounds was long interpreted as a sign of a Late Iron Age 'settlement void' (Fi. *asutustyhjiö*) in the region.

However, during recent decades, pollen samples taken from different ponds and lakes around Uusimaa have clearly shown that field-based agriculture had started in most places by the year AD 1000 and continued without any breaks until modern times (Alenius 2011). This clearly indicates a continuous land use in the region throughout the Late Iron Age, and also during the Viking Age and Crusade Period, demonstrating that the region was never deserted. This seems to be the case especially in the western part of the region, where Iron Age settlement was also most intensive. The revaluation of some of the sites has shown that settlement at some sites in western Uusimaa continued without clear breaks from the Late Iron Age to the Middle Ages (e.g., Haggrén *et al*. 2003; Haggrén 2011a).

Still, compared to the core areas of Late Iron Age settlement in Finland Proper and Tavastia, land use in Uusimaa seems to have been less intensive. Although field-based agriculture was practised in Uusimaa, the scale of cultivation was small (Alenius *et al*. 2017). The number of settlement sites was likely low compared to Finland Proper and Tavastia, as despite extensive efforts to locate Late Iron Age sites in the region during the past two decades only a small number of new sites have been found (Haggrén 2011a). Even increased metal detecting activity has brought new Iron Age finds to light only in some areas thus far (Jäppinen 2015; Wessman 2016). It seems that there were notable regional differences in the Viking Age and Crusade Period settlement pattern in Uusimaa, and that permanent settlements may have been mainly situated in western Uusimaa, while the settlement in central Uusimaa may have had a more seasonal character (Heinonen 2021). Based on place names, the Iron Age land users mainly spoke different Finnish dialects (Kepsu 2005, 2010).

The medieval settlement history of Uusimaa is better known than the Iron Age phases of the region. From the late 12th century onwards, a large number of new settlers arrived in Uusimaa from central Sweden. The colonization continued in waves until the mid-14th century, and as a result of the process Uusimaa, like other parts of Finland, became a part of the Swedish realm (Lindkvist 2002; Haggrén 2011a). By the late Middle Ages, Uusimaa had become a central area of settlement in Finland, characterized by mainly Swedish-speaking inhabitants in the coastal areas and Finnish-speaking settlers further inland. The settlement was based on small villages, typically with only 5–10 farms (Allardt 1898; Haggrén 2011b).

The fact that the Late Iron Age settlement in Uusimaa differed clearly from that of the more central settlement areas raises many questions about the development of the villages in the region. Did the Swedish newcomers establish the first villages in Uusimaa, or were the Finnish land users a part of the process? Were there in fact villages in the region prior to the colonization period? As only a small number of Late Iron Age sites are known from Uusimaa, the medieval settlement sites offer a good starting point for addressing these questions, especially as these sites have been excavated with increasing intensity during the 21st century.

So far, most excavations of medieval village sites have been carried out in central Uusimaa, around the Finnish capital Helsinki (see e.g., Haggrén 2011a; Haggrén and Rosendahl 2016a; Väisänen 2016). Therefore, the material from central Uusimaa is best suited for studying the earliest settlement of the villages. Excavations have also been carried out in western Uusimaa, but these have been quite small-scale compared to those in the central part of the region (Jansson *et al*. 2010; Haggrén 2011a). Still, even the small-scale studies offer an interesting set of reference material, and enable some preliminary discussion on regional differences.

Iron Age and medieval settlement in central Uusimaa in the light of four case studies

Because the Late Iron Age settlement history of Uusimaa is still only vaguely known, the studies focusing on the Iron Age and early medieval settlement history of the region have mainly concentrated on settlement history on a large scale: identifying the sites, dating them, and establishing chronologies (e.g., Haggrén 2011a; 2011b). The relationship between the Swedish colonists and the Finnish-speaking groups has also been discussed (Rosendahl 2016; Heinonen 2020), and the medieval villages have been studied from different perspectives (e.g., Koivisto *et al*. 2010; Harjula *et. al* 2016). However, the development of the villages has been less assiduously examined thus far.

The archaeological material excavated in the 21st century offers a good basis for studying the development of different village sites. The best case studies are provided by four villages located in central Uusimaa: Köklax, Mäkkylä, and Mankby in the modern-day area of Espoo, and the old village site Gubbacka in Västersundom, located in modern-day Vantaa (fig. 1). All of these sites have been extensively excavated, and the archaeological evidence points to all of them being founded by the late 13th century. Based on the rich material available for study, it is possible to discuss when these sites were first settled, what language the first inhabitants likely spoke, and at what point these settlement sites could be called villages. A typical characteristic for Finnish historical villages is a shared plot, where the dwelling houses of the farms were located in the village area, so a central part for studying the settlement history of Finnish villages is to determine when several farms have been founded on a shared plot for the first time. Archaeological research carried out in western Uusimaa offers interesting comparison material for these sites, although the material from western Uusimaa mainly originates from smaller excavations and is only partly available for research at the moment.

The first settlement at the sites

Place names are often used in Finnish research to establish whether the land users in a given area during a given period spoke Finnish or Swedish, as both language groups have had a central role in the settlement history of Finland, especially in the coastal areas (see e.g., Pitkänen 1985; Kepsu 2005, 2010). Thus, the language used in naming a village is thought to indicate the language spoken by its founders. Two of the studied villages, Köklax and Mäkkylä, have originally Finnish names (Kepsu 2010:72–75, 93–94). The name Mankby is likely derived from the Swedish name Magnus (Kepsu 2010:77–80), and the earliest known name for a village in Västersundom, Gudstensby, is also based on a Swedish name (Kepsu 2005:184–189). Therefore, it seems that the settlement at two of the sites was likely founded by Finns, and two of the sites by Swedes.

There are traces of Iron Age activity only at one site, Gubbacka in Västersundom. Here, a smithy dating from the 10th to 13th century was found during excavation of the medieval village plot. Several sequential structures belonging to the smithy were studied, and based on that evidence the smithy seems to have operated at the site for several hundred years (Heinonen 2012). No dwelling houses or other types of structures dating to the Late Iron Age were found at the site during the excavations. Therefore, it has been suggested that Iron Age land use at the site may have been seasonal, and based on long-distance fishing from Tavastia, a practice that is documented in some 14th century letters of judgement. The smithy was probably used by fishermen to forge small everyday objects they needed during their fishing trips (Salminen 2013:86–96; Heinonen 2021).

It is possible that the earlier users of the site were involved in establishing the medieval village in Gubbacka, but as the names of the villages in the area were Swedish in the early 14th century, it seems unlikely that the Finns had a central role in the process. Instead, a letter of judgement from 1347 shows how the people from Tavastia who used to fish in the area were in a dispute with the local villagers over the rights to use the fishing waters (Salminen 2013:92–96). Therefore, it seems likely that Swedish newcomers had established a village in an area where the Tavastians had traditionally been fishing. This may have happened through an agreement between the two groups at first, if they were mainly interested in different resources (Heinonen 2020). When the Swedish laws were consolidated in the area during the early 14th century, conflict emerged between the groups when the fishing rights were granted to the local villagers. The reason for the conflict lies in the different juridical traditions of the Tavastians and the Swedish villagers (Salminen 2013:92–96). This further suggests that the villagers and the fishermen belonged to different groups, as they were accustomed to different laws and traditions.

At other sites, the earliest traces of settlement date to the turn of the Iron Age and Middle Ages. In Mäkkylä, the oldest buildings are dated to the late 12th or early 13th century (ark-byroo 2016), and a similar dating applies to Mankby (Haggrén and Rosendahl 2016b:78–81). In Köklax, the earliest excavated buildings have been dated a bit later, to the late 13th and early 14th century (Haggrén 2005). Apparently, these sites were first settled during the period of Swedish colonization. This is true even for the two settlements that were likely founded by Finns. The earliest village settlement in Gubbacka also seems to date to the late 13th century (Koivisto 2011), meaning that permanent settlement on the site also began during the colonization period.

Single farms or villages?

Although the four villages that were studied were founded during the colonization period, this does not have to mean that they were actual villages, consisting of several farms, during the earliest settlement phase. In fact, there is no clear evidence from any of the sites that multiple farms were founded before the 15th century on what was later the village plot, although it is important to note that it is often difficult to discern separate farms from the archaeological evidence if no clear boundaries between them were found during the excavations, as is typically the case at rural sites in Uusimaa. Therefore, farms have to be identified based on the location and orientation of different buildings, and the groupings of buildings, that can be distinguished at the sites.

In Köklax and Mäkkylä, several buildings dating to the 13th and 14th century have been excavated, but at both sites these likely belong to only a single farm, based on the location and function of the buildings. In Mäkkylä, the two earliest buildings are located relatively close to each other (fig. 2). The southern one was likely a dwelling house, while the northern building may have been used as a kitchen. Shards originating from low-fired earthenware vessels used for cooking were concentrated around the building, and a number of charred grains were found in the macrofossil samples. The oven of the building was probably built with a clay dome, which made it well-suited for cooking or baking. The oven construction differed from the stoves used in other 13th century buildings at the site (ark-byroo 2016).

The earliest buildings in Köklax followed the same lines, with a dwelling house and a separate kitchen east of it, and a possible workshop just west of the dwelling house (fig. 3; Haggrén 2005). Even when more buildings were erected at both sites during the 13th and 14th centuries, these were still likely used by a single farm. In Gubbacka and Mankby, the earliest building remains are quite poorly preserved, but in neither case do the excavated structures

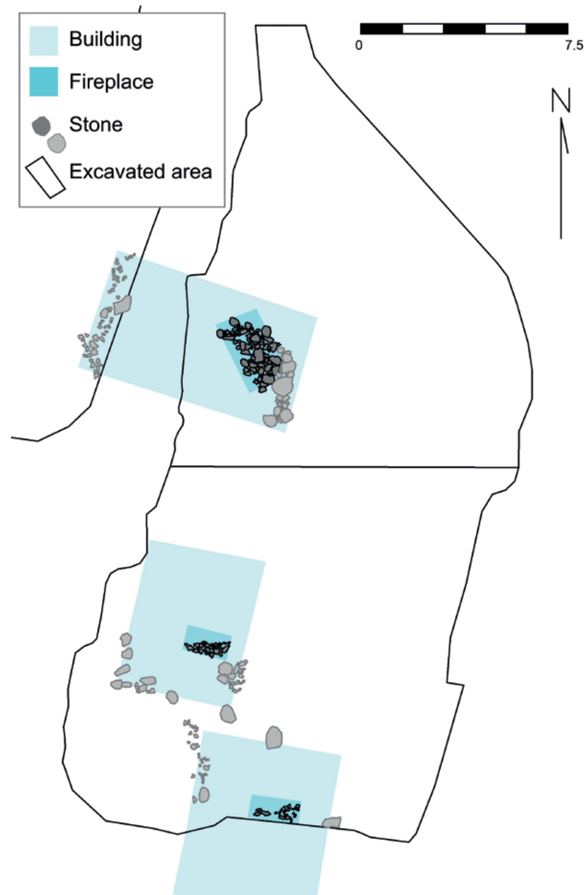

Figure 2. Excavated buildings in Mäkkylä dating to the 12th-13th century. Illustration: Tuuli Heinonen.

indicate that several farms existed at the sites during the 13th or 14th centuries (fig 4).

The number of farms first increased, at all the sites, during the early 15th century. This is best visible in the case of Mäkkylä, where at least two new buildings were founded west of the existing farm during the 15th century (ark-byroo 2016). Based on their orientation and location close to each other, the two buildings likely formed a new farmstead. A similar development is visible at other sites as well, as new buildings located at different parts of the village plots were erected at all sites during the 15th and 16th centuries. Although it is possible that the earlier medieval remains were destroyed by the later buildings, there is other evidence that the settlement also clearly increased in size. Besides the excavated buildings, approximately 20 additional late medieval house foundations have been mapped at both Mankby and Gubbacka, clearly demonstrating the large number of farms in both villages during the late Middle Ages (Haggrén and Rosendahl 2016b:75; Väisänen 2016:45).

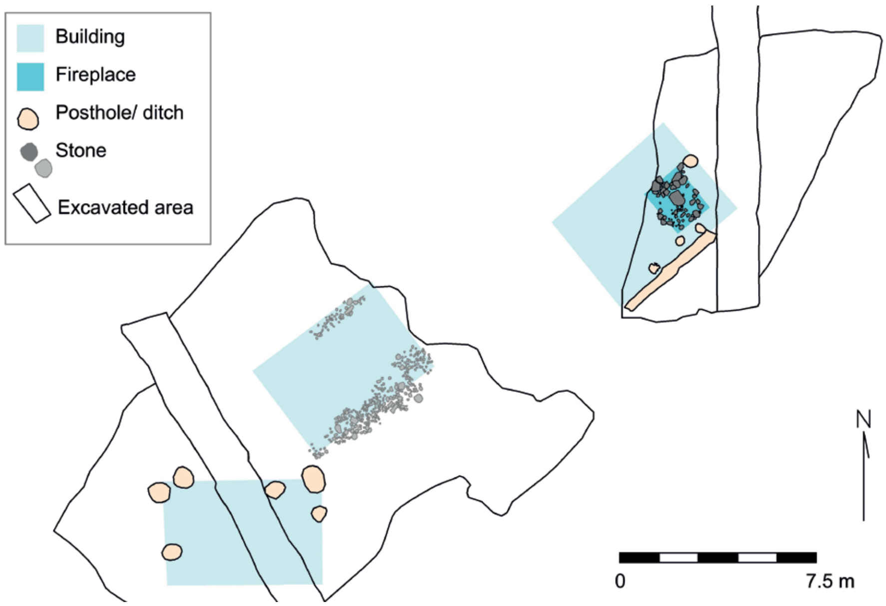

Figure 3. The oldest 13th century buildings excavated in Köklax. Illustration: Tuuli Heinonen.

Figure 4. Only fragmentary structures connected to the earliest buildings in Mankby, such as the 13th century stove shown in the photograph, have survived. Photo: Georg Haggrén, University of Helsinki.

The reasons for this increase in the number of farms may partly be population increase, and partly settlement reorganization – in both cases during the late Middle Ages. The scarce medieval sources do not reveal the exact number of farms in Uusimaa before the mid-16th century, when they were comprehensively listed for tax records. Still, based on the amount of taxes paid by the farms in the 16th century, calculations have been made to determine the number of farms that existed at different times during the Middle Ages. These suggest that in the parish of Helsinge, where Mäkkylä was located, there were only 75 farms in the beginning of the 14th century, and 200 at the end of the century. In the 1540s, from when there are exact numbers available, there were around 350 farms divided between 76 villages in the parish (Salminen 2013:42–43, 259–263). In the villages that have been studied, the number of farms varied between five and eleven in the mid-16th century (Kepsu 2005:185, 2010:72, 79, 93).

These numbers demonstrate clearly how the settlement increased to a significant degree in central Uusimaa from the early 14th to the 16th century. Based on this, it would not be surprising if the initial settlement in many of the

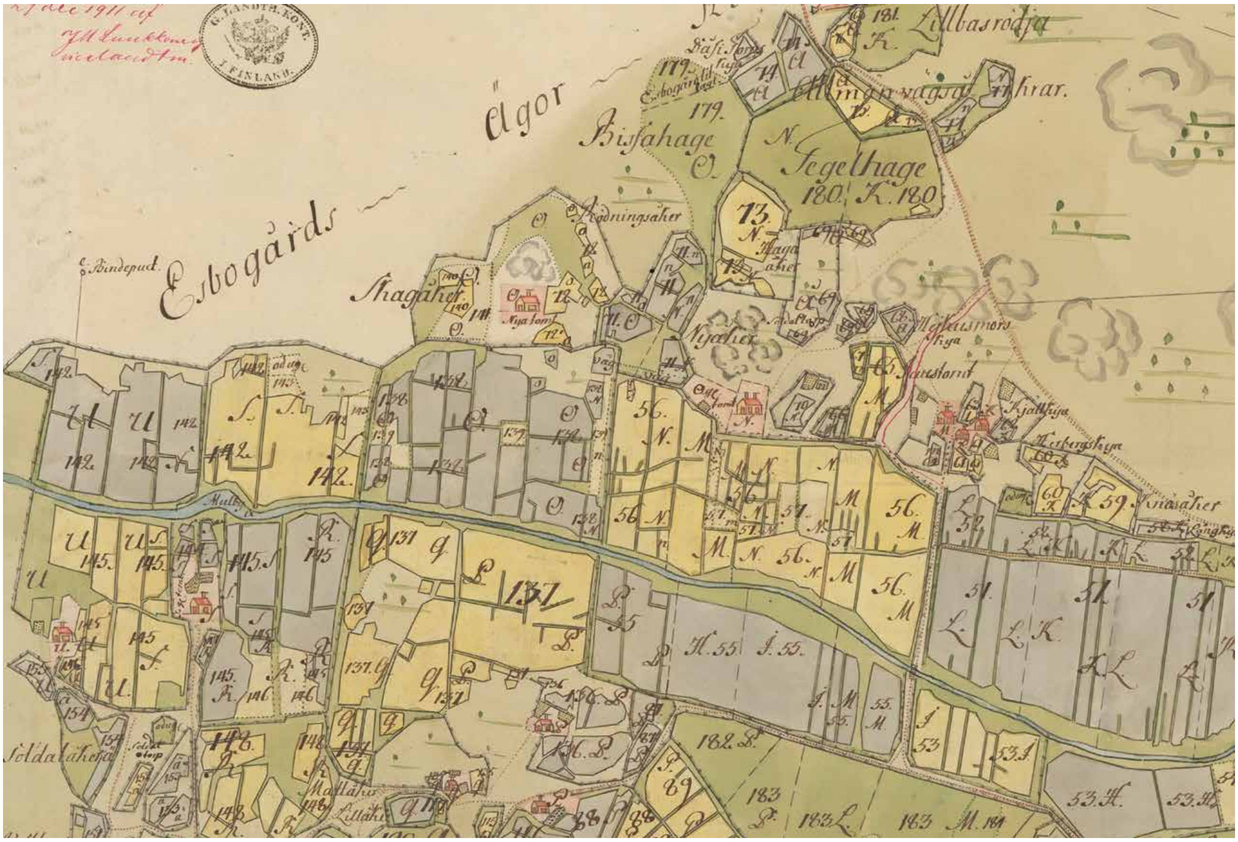

Figure 5. A detail from the map from 1758–1763 shows how there were several plots in Köklax at the end of the 18th century. National Archives of Finland.

villages founded before the late 14th century consisted of a single farm. However, this was probably not the case with every village. Although there are very few written sources concerning rural settlement in Uusimaa before the 15th and 16th centuries, the surviving documents show that some of the place names already referred to village settlement before this. For example, the settlement in Västersundom, likely referring to the Gubbacka site, was already called Gudstens**by** during the early 14th century. As the Swedish word *by* refers to a village (Kepsu 2005:27–33), it seems likely that there were already several farms in Gubbacka in the 14th century.

There may possibly have been several farms already located on the later village plots in the villages that have been studied before the 15th century. As none of the sites studied here has been excavated completely, there may have been more settlement on different parts of the village plot, just spread more loosely around the area than later on. Another possibility is that the settlement was first located in several sites, and that the villages became more regulated during the 15th century, resulting in several farms being moved to a shared plot. Based on historical maps, there were at least two plots in Mäkkylä before the early 17th century (Lindholm 1999). In the Köklax and Västersundom area, there were several plots during later historical times (fig 14.5) (Kepsu 2005:184–189, 2010:72–75). As the excavations have focused on only one of the actual plots at each site so far, the age of the others is still unknown. Some of these may have already been used during the Middle Ages.

The first villages in Uusimaa – discussion

Based on the material from the four case studies, the development of villages in central Uusimaa was a varied process that seems to have started around the same time that the first colonists arrived from Sweden during the 12th and 13th centuries. Both the Swedish newcomers and the Finnish groups that had been using the area during the Iron Age were involved in this process, if the names of the villages are seen as indicating the language spoken by their founders.

Of the cases studied here, both Mäkkylä and Köklax were likely founded by Finns, based on their Finnish names, and Mankby and Gudstensby, as the village in the Gubbacka area was originally called, by Swedes. In all these cases, the earliest signs of permanent settlement on the site dates to the late 12th or 13th century. Even in the cases where there was land use in the medieval village area as early as during the Iron Age, it seems that the village settlement itself originates in the medieval period. Place name researcher Saulo Kepsu has earlier suggested that some of the Finnish villages in central Uusimaa could predate the Swedish colonization (Kepsu 2010:147–148), but at the moment the archaeological material does not support this view.

In Gubbacka, there was continuous land use from the 10th or 11th century onwards, but this land use was likely based on seasonal fishing rather than permanent, intensive settlement. Although an Iron Age smithy that operated for several hundred years was found at the site, no Iron Age dwelling houses or burials were found during the extensive excavations and surveys at the site. The settlement connected to the smithy was likely seasonal and did not result in any buildings with heavy foundations.

It is possible that the villages founded by the Finnish-speaking land users in Uusimaa during the early colonization period constituted a way for the Finns to secure the rights to the areas they had been previously using. This proved to be a good strategy, as it seems that at least in Köklax and Mäkkylä the settlements continued, without any conflicts, after the villages were founded (Heinonen 2020). Apparently, the inhabitants of both villages were among those who changed their language during the Middle Ages, adapting to the Swedish legislation and administration (Kepsu 2010:148). Those who did not establish permanent farms in the areas they had been using prior to the colonization were not as lucky as those who acted in time, as is shown by the example of Gubbacka. Here, the first villages in the area were likely founded by the Swedish colonists during the 13th century. Tavastians who had previously been using the area tried to continue their seasonal fishing even after this, but by the mid-14th century the right to fish in Gubbacka was granted to the local villagers, according to Swedish laws.

Although it seems that the development of the first villages in central Uusimaa began when the first colonists from Sweden started to arrive in the area, the development may have been different in other parts of the region. This is especially true for western Uusimaa, where the Late Iron Age settlement probably had a more permanent character than in the central and eastern parts of the region. There are some cases where settlement here is known to have continued from the Late Iron Age to the medieval period, at the same site. The best evidence for this comes from the westernmost part of Uusimaa, where two separate plots in Hangö village have been excavated. Based on the excavation results, both plots were settled already during the Late Iron Age, suggesting, firstly, that the settlement in the area continued from the Iron Age to the medieval period, and, secondly, that the Iron Age settlement likely consisted of several farms, and therefore could be characterized as a village (Jansson *et al*. 2010; Haggrén 2011a).

However, despite the first villages apparently being founded in different parts of the region at different times, even in western Uusimaa there is little evidence of regulated village plots from the Iron Age or the first centuries of medieval period. Based on the archaeological material, it seems that on many late medieval village plots the settlement started with a single farmstead, and their number only started to grow during the 15th century. It is likely that many of the villages already had several farms before this, but either these were spread more loosely around the village plot or were located on separate plots around the village area. However, as the focus of excavations at most sites has been on single plots, it is difficult to discuss the internal spatial development of the villages in detail at the moment.

Conclusion

Overall, the material from Uusimaa suggests that the development of villages was a complex and gradual process. In some areas, mostly in the western part of the region, the settlement likely continued from the Iron Age to the medieval period, and at some sites the Iron Age settlement may be characterized as consisting of small villages. In the central parts of the region, the Iron Age settlement seems to have been more seasonal, and the more permanent settlements were founded at the turn of the Iron Age and the Middle Ages. Around this time, both the Finnish groups that had previously been using the area and the later Swedish colonists began founding the settlements that gradually developed into the historical villages known from 16th century written sources.

Many of these settlements likely started out as single farms, and even in the cases where the settlements consisted of several farmsteads, they do not appear to have been located on regulated village plots at this point. Archaeological evidence suggests that the settlements were first concentrated on the historical village plots during the 15th and 16th centuries. Many of the sites may actually have been villages before this, if the term village is defined as a settlement with several farms engaged in regular cooperation. However, based on the current archaeological material, the physical arrangement of these settlements and the forms of cooperation they were engaged in are difficult to study.

In the future, archaeological excavations on medieval village plots may reveal much about the village formation process in Uusimaa, and also in other regions in Finland. At the moment, the available material is still quite limited, consisting mainly of Iron Age burial grounds in western Finland and Tavastia, and medieval village sites in southern Finland. Despite this disparity in the available materials, the overall development from single farms into village settlements in Uusimaa seems to have followed a pattern similar to the regions with intensive Iron Age settlement. Some villages in the area seem to have their roots in the Iron Age, but in most cases the developmental process for village plots with several farmsteads seems to have continued long into the medieval period.

The material presented in this paper clearly shows that the process of village formation needs to be explored further in the future. The increasing amount of archaeological evidence will hopefully enable more wide-ranging, in-depth comparisons between different areas of the region in the future. Further comparisons between Uusimaa and other regions in Finland, and also other areas around the Baltic Sea, will likely prove to be fruitful as well, as they would enhance our understanding of the varied nature of village formation in northern Europe during the Iron Age and medieval period.

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Anebjerg - A rural farm from the 17th century: Considerations on Renaissance building traditions in Denmark and what can be expected beyond the Middle Ages

Louise Søndergaard

Abstract

Our knowledge of rural farms of the medieval period might seem limited, but our ignorance increases substantially as we reach the Renaissance. Until very recently this area of research was dominated by historians, and it was widely accepted that historical sources, in combination with the still-standing buildings from the period, provided ample information on this subject. However, historical sources concerning the appearance of the Renaissance farms are few, and recent archaeological excavations have proved written sources to be one thing – the Renaissance farmers' willingness to do what written sources say they ought to do quite another. This article presents an excellent example of a large, fenced farm constructed entirely with hole-set posts. The farm has been dated to the middle of the 17th century, when one would not expect to come upon several buildings with postholes, especially as the excavated artifacts draw an image of timbered buildings with bricks, red roof tiles and lead fitted windows. This excavation yielded a lot of information on the transition from medieval to Renaissance rural building methods, a transition which seems more dominated by practical considerations than by innovative architectural features.

Keywords: Rural settlement, farm structure, farmstead, post-medieval archaeology, material culture vs. written sources

Introduction

Our knowledge of rural settlements from the Middle Ages might be faulty, but not compared to the ignorance that surrounds rural settlements in the subsequent period: the Renaissance (1536–1660 in Denmark). Different factors are held responsible for this. First, a majority of settlement traces are well hidden under existing villages or farms and are thus seldom uncovered and examined. Second, archaeological interest in the rural settlements of the period has not been spectacular either, and, third, traditionally this field of research has been handled by historians and ethnographers.

Architectural studies of preserved farms, oral deliveries of specific design features combined with an abundance of written sources led to an agreement about the development of the rural settlements: the prehistoric and early medieval tradition of digging postholes was phased out in favor of placing the posts on a sill on a foundation

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Figure 1. The location of Anebjerg in Jutland, Denmark. Illustration: Louise Søndergaard.

of stones (Henriksen 2003:94; Rensbro 2003:58ff.). A royal ban on wooden posts set into the ground, issued by Christian III in 1554, and repeated by Frederik II in 1577 (Mejborg 1888:113–114) has, until recently, been accepted – and even acknowledged – as a *terminus-ante-quem* on farms constructed with posts set in postholes. In several parts of Denmark, procuring wood was a major problem during this period, and hitherto it has been taken for granted that this shortage would have increased during the Middle Ages.

The ceramic material of the Middle Ages and the Renaissance is rather similar, resulting in very wide dating frames of the artifacts found in excavations. In addition, the number of artifacts retrieved from excavations is often limited. Taken together, these circumstances have left us with few holding points for Renaissance settlement chronologies. Moreover, using a particular constructional feature – in this case postholes – as a dating criterion is not very helpful, since the archaeological material has not yet been able to give archaeologists very much more to work on. Another issue is that recent excavations show that the written sources should be used with caution (for examples of excavated Renaissance farms in the current Danish area, see Bentsen 2010; Jensen 2012; Hartvig 2016; Jensen 2019; Søvsø 2008a, 2008b). Thankfully, archaeological interest in post-medieval rural settlement is increasing, and the bleak picture outlined here might improve as a result.

The aim of this article is to present the excavation of a large rural farmstead, Anebjerg in Skanderborg municipality in Jutland, Denmark (fig. 1), dated to the 17th century (SBM1637 Anebjerg III del Casa).[1] The farmstead was discovered in an excavation carried out by Museum Skanderborg prior to a residential development. The archaeological area of the museum covers Skanderborg municipality. It is not a large municipality, but a lot of development activity results in a continuous flow of archeological rescue excavations. Nevertheless, archaeological traces of medieval settlements are very sparse, and by far the majority of these rescue excavations deal with Iron Age settlements. A farmstead dating to the 17th century has never been encountered earlier in this area. The only excavation performed on traces of a rural medieval settlement lies almost ten years back – it involved two small houses, carbon-dated to the mid-14th century and built on sill foundations, preserved in an old forest (Hansen 2013). A similar situation presents itself in the

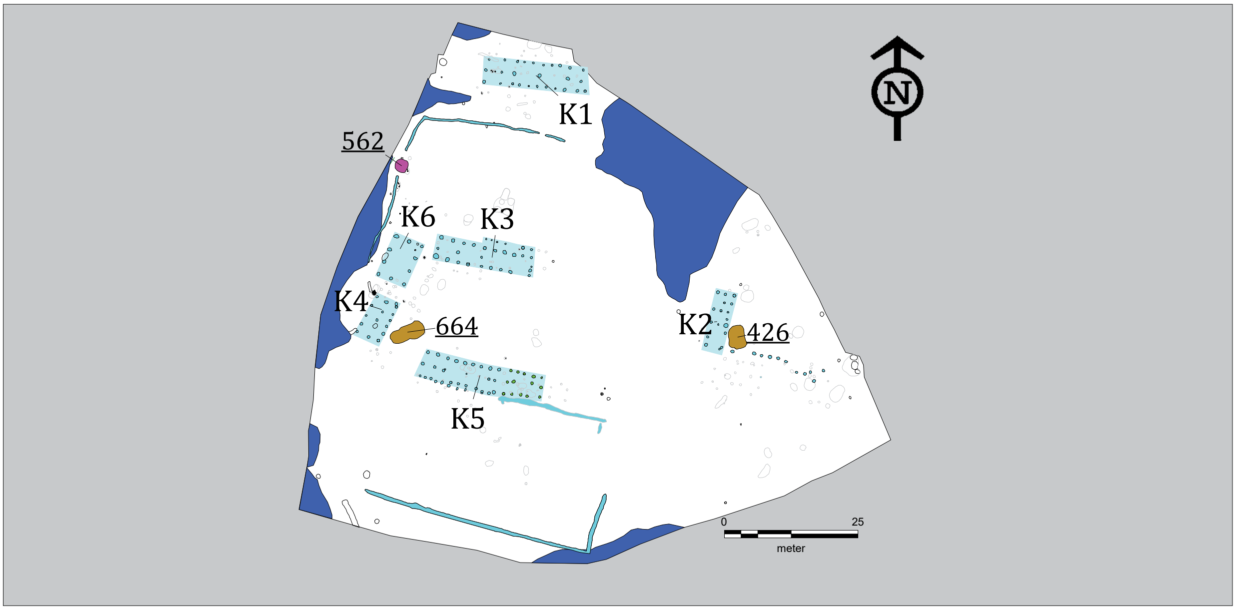

Figure 2. Overview of the excavation site measuring 7500 m². Features marked in blue are low-lying, wet areas, the brownish markings are dung heaps (A664 and A426) and the purple feature in the middle of the toft boundary is a possible well (A562). Illustration: Louise Søndergaard.

adjacent municipalities (Horsens and Silkeborg); rural settlements are few and rarely dated with any more precision than simply being called "medieval". They receive very little mention in the excavation reports, and seldom feature in published material[2].

The results of the excavations at Anebjerg challenge previously approved dating criteria, both concerning the architectural structures and the written sources. This article will present and discuss the different criteria, and also aims to address a few more general questions. Can we rely on the contemporary written laws concerning the use of timber? Can we expect the archaeological material to submit to rules of architectural developments, with a clear progression from medieval to Renaissance? What sort of diversity can we actually expect of a Renaissance farm with respect to building tradition as well as to topography?

The toft

The excavation was carried out in December 2018. The entire hilltop was stripped of its topsoil which provided us with the rare opportunity to see a complete toft. Usually, it is just the buildings or fragments of the toft (a fenced site for a house and its outbuildings) boundaries as they interfere with an excavation of an Iron Age settlement, but here we had the whole picture (fig. 2).

The features were surprisingly indistinct, and most were only recognized because of the tiny fragments of red brick in the infilling of the postholes (see fig. 4). The settlement is constrained by the topographical conditions of this hilly landscape. With the topsoil removed this became even more evident: the low-lying areas, which would, at least seasonally, have been waterfilled at that time, filled up gradually in the course of the excavation. The settlement turned out to comprise a large farm with four buildings, K3, K4, K5 and K6, enclosing a courtyard on three sides opening towards the east, plus two buildings on the outside of the toft, K1 and K2. The farm is centrally located on the toft, which is partially bound by a ditch on all four sides. The rectangular toft measures 74 × 56 metres, thus fencing almost 4000 m². To the author's knowledge, this is the largest complete toft from the Renaissance excavated in the Denmark of today.

Like the courtyard, the boundary of the toft also seems to have had an opening towards the east, although this apparent opening could be a result of the altitude of the terrain and of the topsoil being rather thin here, allowing the shallow ditch to have been partially flattened out by ploughing. More likely, the farm was supposed to appear open from this angle, as it faced the road Anebjerggårdsvej. Obviously, the natural low-lying areas were integrated into the demarcation of the toft, and otherwise the boundary most likely appeared as a low ditch. The ditch was nowhere dug more than 20 cm into the subsoil, and the actual marking of the toft must have been the dike formed by the soil from this ditch. Even if that feature is traceless in the archaeological record.

The farm was situated in the hilly terrain of the western part of Gram Ejerlav, Skanderborg Jorder. Neither written sources nor maps indicate any existence of hamlets or farms in the cadastral district at all, but as the course of the gravel road passing the farm appears on the cadastral map of 1816, other settlements could be expected in the area. Following the road, which is still in use, one will reach the small village of Gram, about 1 kilometer northeast of the farm.

The farm

The design of the toft highlights the three-winged farm which is regarded as the focal point of the settlement (fig. 2). The farmstead consisted of two larger (K3 and K5) and two smaller buildings (K4 and K6), the latter forming the western boundary of the courtyard. As is obvious from fig. 2, all the buildings of the settlement were constructed with postholes dug into the ground. What is less obvious is the difference in construction in each of the buildings, but this will be examined in what follows.

The northernmost building K3 is an east-west oriented structure with straight walls and gables. The length of the house was 18 metres distributed on nine bays, width 4.3 metres. There was an even distribution of postholes in the northern and southern walls, and these have been paired in a timber-framed structure. The span of the bays is fairly even, measuring approximately 2 metres. Two possible postholes placed in the middle axis of the west end of the house are too shallow to indicate that the house should be aisled, but they could have been part of some inner partition. The postholes in the walls were sturdy, and dug 30 to 50 cm into the subsoil, which makes it safe to conclude that K3 was a one-aisled building with roof-supporting wall-posts.

No traces of inner structures revealing the interior design or use of the house were encountered. To the north, a short line of shallow postholes may represent an addition on the eastern half of the north side (Sørensen 2011:106). According to Stoklund, the farmhouses of this period often have additions to the north, functioning as alcoves or storage rooms, reserving the south facing, sun-exposed wall for the insertion of window panes (Stoklund 1980:43).

The opposite larger building K5 was also a timber-framed structure, originally 14.5 metres long, consisting of eight bays. Its width is approximately 5 metres, and the wall posts were arranged in pairs in a regular course; 1.7 metres being the width of the bays. The size and depth of the wall postholes vary. The central axis of the first phase of the house was occupied by four posts, which are not aligned with the paired wall posts. Were the wall posts and the central post in fact aligned across, the central post would not be able to pass the cross beam and reach the ridge board, which is essential for it to support the roof (for descriptions of central posts and their significance according to aisled houses and roof constructions, see Sørensen 2011:105). A large space in the middle of this part of the house K5 did not have any central posts, which indicates that the roof of the construction rested on both the wall posts as well as the central posts – in other words, a hybrid construction. At one point, the building was extended to the east with five additional bays (fig. 2: the extension is marked with green postholes). The wall posts here were also paired, although the course of the walls is somewhat uneven compared to the original part of the building. This might be due to the ditch-like feature on the southside of the extension, though it seems somewhat sloppy to just build around an obstacle instead of removing it (fig. 2). The extension was two-aisled.

K5 also lacks internal features which might clarify a functional interpretation. However, a dung heap (A664, fig. 2) is situated in the corner of the yard where the houses K5 and K4 meet. This may well indicate that K5 rather than K3 was used for livestock (Sørensen 2011:112). Another possibility is that the house was used for storage. The paired wall posts of the houses indicate that the roof constructions most likely were rafter constructions.

Outbuildings on the toft

The two buildings that make up the western boundary of the courtyard must have been coeval, as they are aligned to give a well-organized impression from the courtyard (fig. 2). The southern house K4 is a two-aisled structure with four bays, it is 8 metres long and 4.8 metres wide. The walls and gables are straight. The postholes in the walls are paired, and the central axis of the building was furnished with four central posts, two of which were situated in the gables. As we saw with K5, the central posts are not aligned with the paired wall posts in order to support the weight of the roof around the cross beam. The postholes of K4 are very uniform in both fill and size throughout the building – another indication that they all supported the roof. An additional wall post has been inserted in the east wall. This feature suggests an entrance here – an obvious choice as it would give easy access to both courtyard and dung heap (Sørensen 2011:90). Just behind the house to the west, the terrain drops towards an area of wetland. At both ends of the house an oblong feature protrudes from the building towards the wetland. These might represent a small fence erected to keep animals inside an area that gave them access to water. Combined, dung heap and topography suggest that K4 housed animals rather than crops.

To the north of K4 is K6, a small building with straight walls. The building was constructed with three bays covering a length of 8.5 metres, and the sectional width of the bays was approximately 2.6 metres. K6 is the widest structure at the farmstead, measuring 5.8 metres in width. Apparently, this was considered of no importance to the structural design, as this building was one-aisled. One would expect a wide building to be constructed as an aisled structure, as a wide span would make the structure less stable, especially if the attic of the building was intended for storage.

Figure 3. Excavation of K1 seen from the east end of the building. Photo: Museum Skanderborg.

Buildings outside the toft

Just outside the northern toft boundary were traces of another two-aisled, timber-framed house with straight walls, namely K1 (fig. 2 and fig. 3). This east-west oriented building was approximately 19 metres long and 4.7 metres wide, with ten bays. The width of the bays was fixed at around 1.7 metres, and the construction was set with paired wall posts. The pairs are not as regular as in the other houses, and the eastern end has an additional post. In this house, however, the weight of the roof primarily rested on the six posts that occupied the central axis of the building. Two of these were set in the gables. The central postholes were markedly deeper than the wall posts in the house, and not aligned indicating that the central posts must have had a roof-supporting function.

House K2 was a small, one-aisled building just outside the eastern entrance to the toft. The straight-walled, timber-framed structure was 11 metre long and 3.7 metres wide. The setting of the postholes is rather uneven compared to the other buildings, and it appears that at least one post was set on a foundation slab. Postholes forming a central row were visible, but they were quite shallow and thus more likely to relate to some interior design than to a function as roof-support. Maybe they functioned as stable divisions.

The building is oriented north-south and there may have been a building perpendicular to its southeast corner, as there was a patchy course of deep postholes. In the angle between K2 and these posts there was a large, low pit which was also interpreted as a dung heap (A426, fig. 2).

The dung heaps

During the excavation we examined two dung heaps (A426 and A664 fig. 2). Dung heap A426 was connected to the house K2 outside the toft, and A664 lay in the southwest corner of the central courtyard. Dung heaps consisted of household waste, ashes and droppings from both humans and animals. The utility value of the dung for fertilizing the arable land is reflected by the central location that those stinky piles would often enjoy at the farm – a location where one could easily monitor the valuable heap (Søvsø 2008a:20). The dung heaps at Anebjerg were seen as oblong low pits, identifiable by their infillings and their location. Although

Figure 4. A typical posthole of the site, here from house K2. The infill is exceptionally pale, and often only recognizable on the surface due to tiny fragments of red brick. A piece of green window pane is seen in situ at the top of the posthole. Photo: Museum Skanderborg.

the dung was piled on top of the ground, the retrieval of fertilizing material would over time create a low hollow in the ground (Søvsø 2008a:20).

A426 measured about 4 × 3 metres and was recognizable as a gray-brown blotch with ceramic material visible on the surface. Among the finds were several fragments of a well-fired redware vessel and fragments of medieval bricks. Below the dung heap a small recessed pit appeared, containing an iron knife, a nail and a spoon drill along with teeth of a dog. These were probably put there to protect the vital dung heap from disaster and theft. Knives and pointed objects were common safeguards against evil and used in magical rituals well into present time (Søvsø *et al*. 2016:76).

The second dung heap A664 was 6.5 × 2.5 metres wide with only 7–10 cm of infilling. Yet the wealth of artifacts was remarkable here as well: several shards of well-fired redware with both inner and outer glaze, shards of black pots, as well as tile fragments of both roof and building tiles.

Finds and materials

Apart from ceramics, the most common type of artifacts recovered were building tiles. Mostly bricks, but five fragments of roof tiles indicate that at least some of the houses had tiled roofs. One piece was a pantile, while the rest were of monk and nun type. The infilling in most of the postholes contained tiny fragments of red brick, and in houses K1, K3 and K5 larger brick fragments were present. As the brick fragments were found in the postpipe – the cavity that occurred as the post was removed from the posthole – they undoubtedly originate from the demolition of the farm.

No culture layers were preserved anywhere, and the surroundings seemed practically sterile of finds. The only metal finds were a later coin and six smaller lead fragments found by metal detectorists in the piles of removed topsoil. The lead pieces may have been part of the mounting of the pane or raw material for it, as a piece of green pane glass appeared in a posthole (fig. 4). The piece measures 4 × 4 cm, and two perpendicular edges have clearly been processed with a glass cutter for mounting in a pane (Kock 2006:416).

Every posthole, pit and feature were excavated, and most postholes in the houses were emptied in order to retrieve as much ceramic material as possible. Medieval and post-medieval settlements often yield very few artifacts, and were it not for the dung heaps, this would be the case here at Anebjerg. A total of about 100 pottery shards were collected from the site.

Four categories of pottery were represented, and the distribution of shards within each category was approximately even. The first category was well-fired redware with or without glaze. The second was grayware, represented by rim shards and legs of pots. Third category was rim and body shards of black pots, and the fourth category consisted of undiagnostic shards mainly found in the natural low-lying areas.

No fragments of stove tiles were found, but in well-timbered areas fireplaces were not uncommon in later times, so this might have been the case at the Anebjerg farm (Mejborg 1888:101).

Lab no.	Id	Feature	Building	Type	1 Sigma	2 Sigma	Calibrated date
Ua-64081	X104	A724 Posthole	K1	Charcoal	68.2% probability 1520AD (53.3%) 1600AD 1610AD (14.9%) 1640AD	95.4% probability 1480AD (95.4%) 1650AD	317±29BP
Ua-64084	X117	A318 Posthole	K1	Charcoal	68.2% probability 1640AD (30.8%) 1670AD 1780AD (23.3%) 1800AD 1940AD (14.1%) ...	95.4% probability 1630AD (40.0%) 1690AD 1730AD (37.1%) 1810AD 1930AD (18.3%) ...	228±29BP
Ua-64090	X139	A723 Posthole	K1	Charcoal	68.2% probability 1530AD (1.9%) 1540AD 1630AD (50.2%) 1670AD 1780AD (16.1%) 1800AD	95.4% probability 1520AD (16.2%) 1590AD 1620AD (52.9%) 1680AD 1760AD (18.6%) 1800AD 1930AD (7.7%) ...	252±30BP
Ua-64083	X116	A606 Posthole	K3	Charcoal	68.2% probability 1520AD (45.4%) 1580AD 1620AD (22.8%) 1660AD	95.4% probability 1490AD (95.4%) 1670AD	288±29BP
Ua-64086	X97	A608 Posthole	K3	Charred grain	68.2% probability 1640AD (36.3%) 1670AD 1780AD (22.2%) 1800AD 1940AD (9.7%) ...	95.4% probability 1520AD (2.1%) 1550AD 1630AD (45.0%) 1690AD 1730AD (32.7%) 1810AD 1930AD (15.7%) ...	235±30BP
Ua-64088	X124	A643 Posthole	K3	Charred grain	68.2% probability 1520AD (44.7%) 1580AD 1620AD (23.5%) 1660AD	95.4% probability 1490AD (95.4%) 1670AD	288±30BP
Ua-64089	X132	A426 Dung heap	K2	Charred grain	68.2% probability 1520AD (30.4%) 1560AD 1630AD (37.8%) 1670AD	95.4% probability 1510AD (46.4%) 1600AD 1610AD (44.0%) 1670AD 1780AD (4.9%) 1800AD	273±30BP

Table 15.1. Table of carbon dated material. The samples from K5 are left out.

Dating

The ceramic material is not suitable for a narrow dating of the farmstead. The types and categories are used from the late Middle Ages well into the Renaissance and beyond. The black pots point towards the 17th century, but those shards were found in nearby pits and not in the actual postholes of the houses. Likewise, the building tiles and bricks were of types widely used from the Reformation onwards (Bertelsen 2010:62; Larsen 1986:102). High priority was given to the collection of soil samples for carbon dating, and 80 samples were retrieved from the postholes of the buildings and from the dung heaps. Very little organic matter was retrieved, with a mere ten samples being suitable for research purposes: three from each of K1, K3 and K5 and one from the pit below the dung heap A426 near K2 (tab. 15.1) (Beckel and Håkansson 2019).

The samples from K5 are left out of the table as it was later discovered that they were contaminated by an older pit below the house. All samples from K1 and K3, as well as from the dung heap at K2, have a probable dating from the middle of the 16th into the middle of the 17th century, with an inclination toward the latter end of that spectrum. One could definitely wish for additional dates from the settlement, but even the sparse results of this excavation make it clear that postholes are not an architectural whim of fashion left behind in the Middle Ages.

Interpretation and discussion of architectural design features

The Anebjerg farmstead is in all probability a single-phased settlement with just one minor extension in K5. As the carbon dates show, K1, K2 and K3 (buildings both inside and outside the toft) are coeval (fig. 3). Still, we are clearly not looking at a village. The well-defined demarcation of the central, three-winged farm indicates that this farmstead was planned as such, and not as the precursor of an actual village. The topographical conditions were suitable neither for expansion nor for any significant additions. So, what are the buildings outside the toft? Interestingly, there was a dung heap on both sides of the toft boundary, indicating two separate, agricultural entities. K2 might represent housing for the older generation or, more likely, a steward who might be expected to manage an agricultural landholding of his own. Another possibility is that K2 simply represents additional room for storage and husbandry. But the question arises: Why place these outside the toft? The notion that the buildings might represent another phase of the farm seems unrealistic: the nature of the structures are so alike that they must be coeval, and the topographical placement of the buildings outside the toft also suggests they do not represent another building phase. The lack of replacements in the post structures implies that the complex had a relatively short lifespan. Using prime oak for the earth-fast posts would mean that the posts could last about 50 years – best-case-scenario (Bentsen 2010:159). The clayey and water-logged subsoil at Anebjerg represented worst-case scenario, and

Figure 5. Proposed reconstruction of the three-winged farm. Longhouse K3 in front, and K5 in the background. One of these structures most probably functioned as the farmhouse's living house, while K4 and K6 (proposed here as thatched, timber-framed, wattle-and-daub houses) were outbuildings – probably byre and barn. Illustration: Anders Hagen Mørk, Museum Skanderborg.

obviously the farm was moved when the wood was still usable elsewhere.

Quite a lot of details regarding the exterior of the buildings are clear (fig. 5). All the houses were timber-framed constructions. The larger fragments of red medieval bricks found in the postholes of K1, K3 and K5 suggest that at least those buildings were constructed with bricks in the square panels. No building tile was found in the postholes of K2, K4 or K6, so here the panels were probably wattle-and-daub. That the buildings were entirely made of wood is another possibility that cannot be ruled out (Stoklund 1980:45).

The roof constructions were most likely rafter constructions, indicated by the paired wall posts. Scattered fragments of roof tiles indicate that some buildings have been covered with red tiles, and the rest were probably thatched. At least one building was equipped with leaded window panes. It is not unlikely that several buildings had windows in the middle of the 17th century, but there is no definite chronology on the widespread use of window panes in the countryside (Kristiansen 2006:486-7). A thorough discussion on use of light and windows in medieval buildings in Sweden is provided by Qviström (2020). On use of windows in rural settlements of the Renaissance it is stated that this was uncommon in Swedish settlements in the 17th century – both in villages and in the countryside (Qviström 2020:82). Surprisingly, the glass piece at Anebjerg was found in K2 outside the toft. K2 hardly represented to most prominent house here, based on size and location, indicating that window panes might have been a fairly common feature also in the rural areas. In recent excavations carried out by Museum of Southern Jutland, lots of window glass along with lead fittings were found in rural houses dating to the 16th century onwards, so it was probably not only a luxury of the wealthy farms (Personal comment: Anders Hartvig on the excavations of Sdr. Bjert and Vaskilde).

As every building on the site was constructed with posts put into the ground, the notion that this design was abandoned in post-medieval times should be discarded. The forested areas around Skanderborg meant that local people did not face the challenges of sparsely wooded regions. Hole-set posts prove a very stable construction, and one would most likely choose this design if there was plenty of suitable timber (Rensbro 2003:56). However, the archaeological evidence is still too sparse for us to formulate any conclusions. Also, the whole issue of construction chronology may be fogged by preservation favoring constructions dug into the ground rather than put on top of it (Kristiansen 2019:70). Regional differences in access to suitable building material must have been of decisive importance in relation to the favored design.

At the Anebjerg farm, half of the buildings were one-aisled constructions; the other half were two-aisled, with a central row of posts. Both designs exist, not only simultaneously, but also side by side. This suggests that functional requirements of the buildings were decisive for the chosen construction, as opposed to a desire to meet the latest architectural innovations. The picture has never been crystal clear, but the predominant view has long been that the development went from the two-aisled construction to the one-aisled (Stoklund 1980:39; Ethelberg *et al.* 2003:439). At the Anebjerg farm, K1 and K4 were two-aisled, while K5 was a hybrid construction with a central one-aisled room and the ends of the house two-aisled. Looking at the other recently excavated farms of the Renaissance, which are predominantly one-aisled, this could appear somewhat unusual (Søvsø 2008b; Bentsen 2010; Jensen 2012; Jensen 2019). But with less than ten other buildings to compare with, and all of them built in southern Denmark, this seems a flimsy basis for a comparison, especially as these other farms are geographically fairly distant. Moreover the Anebjerg farm comprises a lot more buildings than the ones excavated in the southern part of the country, which means that a more varied architecture might be expected.

The function of the buildings is unclear, but most likely K3 functioned as the living house (fig. 5). Both K3 and K5 meet the requirements of an east-western orientation, which exploits the benefits of the sun, advantageous to residential use, but if the small projection on the north side of K3 actually represents alcoves, it supports a notion of K3 as living quarters. Also, the dung heap at the west end of K5 indicates some sort of husbandry in that building. The smaller houses K4 and K6 most probably acted as byre and cowshed, indicated by orientation, size and location adjacent to the natural waterfilled hollow. The natural terrain rises toward the east, and large parts of buildings K3 and K5 would have been used for storing grain, fuel and other household goods.

Topography and economic dimension of the farm

Earlier, Danish settlement research was preoccupied with the question of whether village or farm was the original settlement-type, but now there is growing support for the view that both types existed simultaneously. Settlement was determined by geographical conditions rather than development, meaning that single farms were predominantly situated in areas of low quality arable land, in which a village community could not be maintained (Stoklund 1997:61). This hardly applies to the Anebjerg Farm. The number of well-excavated and firmly dated farms from the 17th century in the current Danish area is still too limited to make any real assessments of the dimensions of the Anebjerg farm (Kristiansen 2006:476), but with a building mass of six houses, it hardly seems a farm where it would be difficult to make ends meet. Ten acres of arable land surrounded the excavation, but not a single trace of ridge and furrow was observed in the trial trenches. Of course, that might be because the ridges ran parallel to our trenches, but it is also possible that the land hasn't been intensively cultivated in the periods where this would leave visible traces. There is no written testimony to any activity in the area prior to a sales advertisement from 1779 for a large farm nearby which talked of extensive forests and outstanding arable land (Without author in Østjysk Hjemstavn 1954:154).

Obviously, wood was not in short supply here, as underlined by the architectural adoptions, and it seems very likely that the prime economy of the Anebjerg farm was forestry in combination with livestock. It is worth noting that many of the place names of the area written down in 1683 indicate forest growth (Heilskov 1921:13). This would also explain the location chosen; the rather small and naturally bounded hilltop was never intended to develop into a hamlet, even though the natural resources were plentiful.

Still, the life of the farm was short, and neither written sources nor archaeological testimony can explain why. Clearly, a thorough demolition of the farmstead happened at a time when the building materials were still in recyclable condition. Brick residues and broken household items were left behind, but otherwise all the material from the constructions was carried away, reminding us of the days when supplies were more expensive than labor. One of the advantages of timber-framed constructions is the rather easy relocation of buildings, and it was probably a lot less troublesome to relocate a farm than we imagine (Vensild 1994:56). Why the farm was demolished and moved is unclear. There could be many reasons for this. Maybe the ground was too waterlogged for a contented life here, which could have been an uncomfortable surprise since the location chosen was a hilltop. Another factor could be personal misfortunes or the changing political climate that became instable in the second half of the 17th century. The Swedish wars were responsible for several fires in nearby parishes in the end of the 1650s (Soegaard 1910:125–139), and even though the Anebjerg farm shows no signs of fire, the political situation probably made it safer to move back to the nearby village of Gram.

Conclusion

The archaeological evidence available on rural settlements is still far too limited to draw definitive conclusions on house typology, building elements and fixed chronology. In fact, at this point it seems like anything is possible in late medieval and Renaissance architecture. We are only fooling ourselves if we imagine that we might be able to date any buildings from that period on the basis of what we find in the trenches. And this probably also applies to the preceding medieval period.

A few things seem certain, however: hole-set posts are not a typological feature that points backwards. In spite of the constraints on building styles contained in official royal regulations, it is not possible to use postholes as a fixed chronological parameter. This is emphasized by the Anebjerg farm as well as the other recent excavations of Renaissance farms. Window panes were probably both more common, and in use earlier, than what is usually assumed, and single farms were not just a feature of barren lands on the outskirts of the cadastral districts. Dating criteria in relation to one- or two-aisled houses are not possible to demonstrate either. Certainly, questions of stylistic trends and architectural fashion were of little account here – instead, it was a combination of the functionality of the building, local tradition and access to suitable building materials that dictated the design of the construction.

The Anebjerg farm has provided important information on the development of rural settlements in the post-medieval period. Variations in construction were truly vast, and what may look like development might just be reflections of the abyssal difference between prosperous and impoverished. Therefore, it is essential to get as many buildings and settlements from the Renaissance excavated and dated, and research results published, as possible. Many museums in Denmark still pay no attention to features of this period, which leads to a marked distortion in the material. It is hardly a reflection of the Renaissance that all inhabitants lived in the southern part of Denmark. It rather reflects the attention and interest of the archaeologists and museums in this area. Future archaeological excavations hold the key to the doors of insight; but chances are that this insight might conclude that the diversity is too vast to form any applicable typology.

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Notes
1. Parts of this article have also been published in Søndergaard, L. 2020.
2. These observations are based on data from the national register of archaeological sites, as well as personal comments from Kirsten Nellemann, Peter Mohr and Lars Pagh from the Museums of Horsens and Silkeborg.

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COMPLEXITY AND DYNAMICS

How did people organize their settlements in later prehistoric societies? How do architecture, spatial organization, land divisions, and landscape use relate to different modes of social organization? The papers in this book contribute to a greater understanding of the complexity and dynamics of settlement and landscape organization in the Nordic countries from the Late Bronze Age to the Renaissance.

Among the topics addressed is the notion of the wandering settlements as the standard settlement pattern across southern Scandinavia in the last millennium BC. This idea is nuanced by in-depth regional studies. Up-to-date methodological and theoretical insights are employed to shed light on over-arching patterns of demography and the interaction between humans and the natural world, as well as on technological adaptation and innovation. Contributions to the book explore the nature of the relationships between settlements: both symmetrical relationships, between neighbouring farmsteads, and asymmetrical relationships, between farmsteads representing different levels in a social hierarchy. Spatial and temporal relations between communities of the living and the dead are also discussed.

This book provides a comprehensive update on current research and methodologies in settlement archaeology in the Nordic countries. It is intended for students, archaeologists, and the interested reader working with settlements, landscape use, and social organization.

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