Nordic Urban Archaeology

– Experiences and New Directions

Edited by Kirstine Haase, Hanna Dahlström, Georg Haggrén, Joakim Kjellberg & Chris McLees.

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Nordic Urban Archaeology - Experiences and New Directions

Conference proceedings from the first meeting in Network of Urban Archaeology – NUA23 –
at Copenhagen City Hall 10-12 May 2023

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The City Hall in Copenhagen during a coffe break at the conference. Photo: Kirstine Haase.

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Content

Introduction

By Hanna Dahlström, Kirstine Haase, Georg Haggrén, Joakim Kjellberg and Chris McLees

In the spring of 2023, the conference "Nordic Urban Archaeology – experiences and new directions" was held at the City Hall in Copenhagen. At the conference, more than 150 archaeologists from the Nordic countries shared their experiences and knowledge during three eventful days.

We, the editors of this volume, initiated the conference based on our reflections and discussions triggered by the numerous large-scale archaeological excavations that have taken place in many towns and cities in the Nordic countries during the last decades. Most have arisen in connection with the large-scale development of urban centres. A common feature of rescue excavations is that they are not initiated based on research questions or research projects. Nonetheless, many have significantly increased the volume and range of archaeological data – and research. In most cases, this material holds an increasing potential for providing new results and insights relating to past urban life in our historic towns and cities.

We encouraged the participants to explore the current situation by focusing on the outcomes of excavations, research projects, and other experiences rooted in urban archaeology and – not least – to look ahead to see what the future holds. The goal was to let the various experiences form the basis for mutual inspiration and synergy.

Some of the questions that were debated were:
What is the current situation regarding the practice of urban archaeology in the Nordic countries? What experiences have we gained? How can they advance urban archaeology and research? What does the future hold?

The ground is prepared for the generation of new research questions and knowledge regarding our historic towns and cities. Large-scale excavations and research projects in Trondheim, Bergen, Oslo, Turku, Nya Lödöse, Uppsala, Kalmar, Stockholm, Copenhagen, Odense, and Ribe have provided new insights that point to the emergence of a new emphasis in urban archaeological research. From mainly asking questions linked to classic diagnostic urban traits, such as the functional, topographical, economic and administrative aspects of urban centres, recent research has focused on the social and relational aspects of urban life. A new urban research agenda along these lines has been called for.

In addition to the production of new data by many recent excavations and projects, artefacts and data already stored in university and museum archives and collections are being revisited. A challenge here is that this material has been documented and curated according to very diverse methods and levels of detail. Furthermore, contextual information is often absent or difficult to recreate. Nonetheless, we owe it to the older material to consider how its information value can be placed on an equal footing with that of newer data.

Parallel with this development, the application of natural scientific methods has become more economically viable and relevant for archaeology. An increasing range of scientific analyses can now contribute information at an unprecedented level of detail. Stratigraphic excavation methods are used consistently within archaeological fieldwork. At the same time, fieldwork has become highly specialised, employing increasingly diverse and detailed retrieval and documentation methods.

The financial framework for urban archaeology has improved in some respects in recent years. However, resources must still be prioritised in connection with fieldwork, and given the growing range of available scientific analyses, limitations on resource use are unlikely to diminish.

Given their potential for producing new knowledge, expectations regarding the outcomes of ar-

Excavation behind *Industripalæet* in Odense, c. 1915. After a photo in the National Museum, Denmark. Photographer unknown.

chaeological excavations have increased. There is also a requirement that archaeological investigations be informed and driven by relevant research questions, and there is a growing expectation that their results should have contemporary societal relevance.

A single conference cannot provide answers to these challenges and developments. However, we wanted to initiate a debate and share experiences and knowledge that will strengthen the position of urban archaeology in the future. The contributions presented at the conference and those published in this volume will contribute to reaching this goal.

Contents

This volume consists of nineteen contributions representing the variety of the conference: from-research articles (peer-reviewed and marked with *) to theoretical and empirical studies and posters presented at the conference reworked into articles.

The editors want to thank all the participants at the conference, not least the speakers and authors, for their contributions. We also want to thank our respective institutions, the Museum of Copenhagen, Carlsberg Foundation, Centre of Excellence for Urban Network Evolutions (UrbNet) - The Danish National Research Foundation under the grant DNRF119, Aarhus University, Letterstedska Föreningen for making the conference possible and Farumgaard Fonden, Letterstedska Föreningen and Lillian og Dan Finks Fond for supporting this publication.

The past 30 years: New perspectives on the urban archaeology of the Nordic Countries – a short review

By Hanna Dahlström, Kirstine Haase, Georg Haggrén, Joakim Kjellberg and Chris McLees

With a title that paraphrases the most recent major publication with a common perspective on the Scandinavian medieval cities, this article seeks to provide an updated view of the development and practices of Nordic urban archaeology (Andersson *et al*. 2008). We will try to shed light on what unites and what distinguishes urban archaeology in the Nordic countries. The article is based on papers given by the authors as an introduction to the conference *Nordic Urban Archaeology - experiences and new directions*, which took place in May 2023 in Copenhagen.

Depending on perspective and political angle, the modern Nordic region can be seen either as an association of closely related regions with a common and varied history or as a historical conflict zone with sharp, political borders drawn between today's countries. In the present context, we prefer the former definition, as many of the sites we investigate archaeologically have changed nationality and political sovereignty since they emerged, sometimes several times.

Nevertheless, contemporary urban archaeology operates within different national cultural heritage policy frameworks and national economic cycles. At the same time, as has been emphasised many times before, cities in different countries and within the Nordic region as a whole are historically and functionally often more similar to each other than to their immediate surroundings and agrarian environments. They were part of extensive networks that crossed both economic and geographical borders.

So, what is the state of urban archaeology in the Nordic countries today? What new insights and experiences have been gained during the past decades? Have new agendas been set and tested? Furthermore, what are the challenges that urban archaeology faces? These are the central questions that we seek to address in the following. The aim is to create an overview that will allow us to see some common traits and differences and indicate what new avenues lie ahead for Nordic urban archaeology.

The state of urban archaeology in Sweden

In the past three decades, urban archaeology in Sweden has undergone significant transformations, marked by notable advancements in methodologies and theoretical frameworks. The foundational *Medeltidsstaden* project, active from the late 1970s to 1990, established an essential framework for analysing urbanisation through functional, topographical, and legal lenses (Andersson 1990). It also contributed greatly towards urban deposits - though mostly only in the medieval towns - becoming protected as national heritage monuments in their own right from 1978 onwards. While this project remains a critical reference for researchers, covering 70 medieval towns within the boundaries of present-day Sweden, contemporary Scandinavian archaeologists increasingly view towns, their inhabitants, and material culture as integral components of evolving urbanity rather than mere reflections of top-down societal processes (Larsson 2000; Tagesson 2002; Larsson 2017; Kjellberg 2021). Swedish urban archaeology now more fully recognises the complexities of urban life which are shaped by various historical influences.

As a result of the revised Kulturmiljölag (KML - the Cultural Heritage Act) from 2013, which extended the conservation limit to 1850, more and more early modern towns have seen a development in the production of urban archaeological knowledge, especially in the north of the country (Bäck 2015). This has contributed to the gradual dissolution of formerly distinct disciplinary boundaries between historical periods and urban-rural divide. As a result, more archaeologists currently work on both sides of the urban-rural divide and in wider chronological contexts than they did in the past. This contributes to a greater awareness among archaeologists and urban planners alike that modern cities and towns develop as a result of intricate historical processes.

Advances in Methodology and Academic Discourse

In recent years, substantial progress has been made in urban developer-funded archaeology in Sweden, particularly regarding methodological innovations. Thanks to new technologies and a wider array of available and affordable analyses, we can extract far more from a single context than was possible 30 years ago, provided adequate resources exist. The most significant leap, to paraphrase Stefan Larsson (2017), can be described as a shift from a vertical to a horizontal understanding. This applies not only to documentation

practices and stratigraphy but also to our view of the past and society. It acknowledges the actions of many agents, rather than solely top-down hierarchical decision-making (Kjellberg 2021).

The late 1990s ushered in breakthroughs in contextual methodologies and field practices. However, many early 2000s publications still relied heavily on narratives rooted in the *Medeltidsstaden* project, as critical questions regarding the emergence of urban settlements and the development of urban landscapes remained to be explored.

A significant change occurred in 2005 with the reorganisation of Lund University's Department of Medieval Archaeology into the Department of Historical Archaeology. This pivotal development broadened the perspectives within urban archaeology throughout Sweden, particularly regarding later phases of urban developement. Today, many archaeological projects still examine urbanisation but with an increased focus on achieving a balanced understanding of earlier and later periods, including previously overlooked early modern towns, especially in northern Sweden. This evolution has also been characterised as a shift from a strict focus on *urbanisation* to a broader *archaeology of urbanity* (Thomason 2011).

A critical evaluation of past archaeological paradigms highlights the inherent limitations in emphasising historical, monumental, and topographical perspectives (Larsson 2000; Tagesson 2002). This approach has occasionally been criticised as a dehumanising portrayal of medieval towns and the urbanisation process, overlooking the multifaceted social networks that inform these histories (Carelli 2001; Christophersen 2015; Roslund 2018). Since 2006, numerous publications have enriched the study of urbanism and urbanity, significantly impacting research within the field. This re-evaluation acknowledges prior critiques and reinforces the importance of recognising individuals as active participants in the urbanisation process. Attention has increasingly been directed toward diachronic change and the dynamic factors fuelling these developments, moving beyond a focus on understanding the origins of settlements. Research across Scandinavia has shifted towards exploring cross-border meeting places from the Iron Age, applying world-systems theory, and investigating the heterogeneity of urban settlements throughout prehistory to the present (Andersson 2009). As a result, urban archaeology is becoming more responsive to the urgent challenges posed by modern society and its implications for future research (Sinclair 2010).

As international academic discussions regarding urban spaces have expanded, questions about their impact on Sweden's urban archaeology remain, particularly given the field's historically close ties to antiquarian practices. Despite the numerous urban excavations undertaken over the last 30 years, and with the exception of some notable recent studies and projects, findings from many Swedish towns remain underrepresented in academic discourse. Urban archaeology in Sweden thus faces challenges such as a lack of updated compilations and comparative literature that effectively link various towns and sites beyond the limitations of individual excavation reports. The absence of comprehensive syntheses detailing medieval urbanisation regionally and nationally, comparable to earlier process-oriented studies, exacerbates the disconnect between archaeological practice and scholarly discourse.

The Swedish System, Economic Context and Current Trends

Evaluating the economic context that has shaped urban archaeology in Sweden over the last 30 years reveals the interplay of growth and recession. The early 1990s experienced a significant boom in urban development, followed closely by a recession that severely limited major excavation projects for an extended period, from the late 1990s into the early 2000s. For many years, the size and number of urban excavations diminished, and for many archaeologists, watching briefs became the primary work rather than large infrastructural projects and property development in medieval city cores (Kjellberg, Syse & Ölund 2015).

The transition to the new millennium represented a pivotal moment for urban archaeology and Sweden's broader discipline of archaeology. During the early 2000s, a competitive tendering framework for developer-funded archaeological excavations began to take shape and spread across Sweden. In the Swedish system, the Länsstyrelse (County administrative board) acts as a third party between the developer and the archaeologists, and sets the conditions, responsibilities and limitations for an excavation including the agreed budget. On a case-by-case basis, costs for

a report, research and communication with the general public can be included in the budget. The system is supposed to ensure quality, and the cost is not the sole factor in deciding which company or museum is ultimately awarded a project. The shift prompted various institutions, museums, and companies involved in contract archaeology to adapt their strategies, while some faced closure. The last ten years have, however, seen a renewed upswing in larger urban archaeological projects in cities such as Nyköping, Göteborg, Enköping, Stockholm, and Kalmar. The results from these excavations are expected to significantly influence the development of Sweden's urban archaeology in the coming years.

To evaluate the current status of urban archaeology in Sweden, one can use data from Riksantikvarieämbetet in the ASK system (Allmänt handläggarstöd Kulturmiljö), particularly concerning *stadslager* (protected urban deposits). The implementation of the ASK system is still ongoing. Although it is supposed to be utilised by all county administrative boards, its distribution appears to remain uneven throughout Sweden and among different decision-makers. Consistent data can primarily be observed for only the past five years. While this limitation complicates a thorough analysis of urban archaeological practices, it is arguably the only data available to showcase the challenges and opportunities within the archaeological landscape today.

According to the ASK system, approximately 290 urban excavations are undertaken annually, most of which consist of smaller interventions, such as preliminary assessments and watching briefs. For projects with budgets expected to exceed 1.2 million SEK, competitive bidding becomes necessary. Data indicates that only c. 3-4 major excavations are conducted nationally each year. Excluding these major excavations, such as the large-scale Slussen project in Stockholm, the total expenditure on urban archaeology approaches 13.6 million SEK each year. Distributed over 290 excavations, this is seemingly too small an amount, and it surely reflects the ASK data's unevenness. The number and variety of stakeholders involved in urban archaeology in Sweden—approximately 27 different institutions, museums, and private companies—underscores the need for coherent transparency strategies and comparable results.

Geographical analyses of excavation activities in the ASK system reveal that there is a concentration of excavations in densely populated areas, particularly in central, eastern, and southern Sweden, and within commuter distance to major urban centres like Stockholm, Göteborg and Malmö. Even with the larger excavation projects excluded, the northern and western regions receive disproportionately less attention. This distribution not only mirrors historical legacies, since many older towns are situated in more affluent areas, but also points to the need to address changes in conservation legislation, including the need to consider later urban deposits up to 1850. There is an urgent need to explore and accurately represent the urban histories of smaller towns and the later stages of Swedish urbanisation in the future.

Future Prospects

In summary, the evolution of urban archaeology in Sweden over the past 30 years has been shaped by a dynamic interplay of historical frameworks, theoretical and methodological advancements, and socio-economic factors. Although the field has matured and professionalised, it still grapples with contemporary challenges related to urban development and the preservation of archaeological heritage. Looking ahead, urban archaeologists must advocate for integrating archaeological considerations into urban planning processes, also outside their already established arenas. Active participation with a wide range of stakeholders, including urban planners and community members, will be essential for facilitating constructive discussions about preserving heritage while accommodating urban growth.

Much promise exists for the future of urban archaeology in Sweden in untapping the fuller potential of digitisation and digital documentation. The funding of the national infrastructure project of SweDigArch, a collaboration between several universities, museums and cultural heritage institutions, will make large amounts of heritage data from excavations findable, accessible, interoperable and reproducible in the near future.

By leveraging technological advancements and valuable research results, and enhancing public and academic engagement initiatives, Swedish urban archaeology is well-positioned to shed light on the complexities of urban life. Our ongoing exploration of urban heritage transcends mere

academic inquiry; it is a vital link between historical narratives and present realities, shaping our understanding of present and future urban environments. As we continue to navigate these challenges, urban archaeology promises to uncover profound insights that enrich our knowledge of the vibrant and intricate nature of urban spaces throughout Sweden.

The state of urban archaeology in Finland

Compared to other Nordic countries, urbanisation in Finland was both late and slow. The oldest and largest of the medieval towns is Turku (Sw. Åbo), which was founded around 1300 and had less than 3000 residents in the middle of the 16th century. The rest of the medieval towns were small. Until 1809, Finland was part of Sweden, and therefore, underlining their historical context, research on the six medieval towns in Finland is often counted among the Swedish medieval towns. This is also the case with Vyborg (Fi. Viipuri, Sw. Viborg), which has been part of Russia since 1944.

Several new towns were founded in Finland during the early modern era, three of them already in the 16th century. Among them was Helsinki (Sw. Helsingfors), the present capital, founded in 1550. The number of towns more than doubled during the 17th century, and some new towns were also established in the 18th century. In the early 19th century, when the old ties to Sweden were cut, and Finland became a Grand Duchy in Russia's Empire, there were twenty-five chartered towns within the borders of present-day Finland. Most of these towns were located along the Baltic Sea coast. Before the Russian era, beginning in 1809, Turku was far larger than any of the other towns in Finland, but it lost its position to Helsinki, which became the capital of Finland in 1812.

As is the case in Sweden, some Finnish towns, including Helsinki and Vaasa (Sw. Vasa), have been moved to a new location due to the effects of land rise caused by post-glacial rebound. The maximum of this geological phenomenon is located in Southern Ostrobothnia. Land rise near Vaasa for example, is almost 1 cm per year or about 90 cm per century. As a result, the original harbours for several towns are situated on dry land today.

The Swedish *Medeltidsstaden*-project was adapted to Finland in the early 1980s, and four reports following the Swedish model have been published (1981–1988). A report focused on Old Helsinki (1550–1640) saw daylight in 1989, also based on the model used in the *Medeltidsstaden* series (Andersson 1990).

In 1999, the Finnish National Board of Antiquities (NBA) - known since 2018 as the Finnish Heritage Agency (FHA) - started a systematic urban archaeological survey of the towns established during the 16th and 17th centuries (Niukkanen 2004). All these early modern towns were surveyed with only one exception, and 13 reports were published within a few years (2000–2003). This project was subsequently completed with the survey of the only remaining 17th-century town, Nykarleby (Fi. Uusikaarlepyy), in 2015, as well as that of a late 18th-century fortified Russian town called Ruotsinsalmi (Sw. Svensksund) in south-eastern Finland. This area had already become a part of the Russian Empire in the 1740s. Surveys of three medieval towns (Naantali (Sw. Nådendal), Porvoo (Sw. Borgå) and Rauma (Sw. Raumo)) have also been updated between 2008 and 2015. These new surveys of the medieval towns also incorporated the early modern urban areas built before the early 18th century. As a result, with one exception, all the urban areas settled before the early 18th century have been surveyed during the 21st century. This exception consists of the relatively large early modern parts of Turku.

Legislation

The existing Antiquities Act (295/1963) came into effect in 1963. In practice, it originally protected only the medieval monuments and the best-preserved ancient remains in the medieval town areas. The interpretation of the protection, based on the law, has gradually changed through time. With a basis in the surveys related to the *Medeltidsstaden-project*, medieval urban structures and contexts were automatically protected by law in the 1980s. In about 1990, this protection was broadened to 16th-century towns, in 2000 to urban areas dating to the 17th century, and in the 2010s to some of the 18th-century urban areas too. In the 2010s, protection was stipulated for remains older than the great fire of 1827 in Turku, the most important Finnish town. A new Antiquities Act has been under preparation for several years, and it will probably see daylight in the near future (Niemelä 2023).

Until recently, the interpretation of the law and consequently the degree of protection of ancient urban remains varied between towns. There were no provincial or town archaeologists in some parts of the country, and the controlling eyes of the National Board of Antiquities were far away. As late as 2018, an 18th-century marketplace, deserted after the great town fire of 1852, was uncovered without any archaeological documentation by some of the citizens of Old Vaasa! The protection of urban remains became much more effective in practice when a new Museum Act (314/2019) came into effect in 2020. This stipulates that there must be an archaeologist in every provincial district in the country. Today, there are 21 museums with this kind of regional responsibility. Control is currently much better, and there is less variation in practices and interpretation of the law between different towns (Niemelä 2023).

In Turku, numerous archaeological activities took place already before the 1980s. However, the potential of urban archaeology was first properly understood in the 1980s or 1990s. Before 2000, hardly any excavation projects conducted in the medieval part of Turku had enough resources for executing the whole process related to the fieldwork, its documentation and reporting.

Only a handful of excavations took place in other towns before an ambitious research project was conducted by the City Museum of Helsinki on the site of Old Helsinki (1550–1640) between 1988 and 1993. Large areas were excavated, but further analysis of the results is still lacking. The real breakthrough of early modern urban archaeology took place in Tornio (Sw. Torneå) in the late 1990s and early 2000s. Today, much archaeological fieldwork takes place in certain towns like Helsinki, Oulu, Tornio and Turku, while in many other towns hardly anything happens in terms of archaeology.

Archaeology is taught in three of the Finnish universities. In Oulu, the archaeologists focused their urban archaeological research first in early modern Tornio and subsequently in Oulu (Sw. Uleåborg). Based on the material from Tornio, Timo Ylimaunu succeeded in defending the first urban archaeological doctoral thesis in Finland in 2007 (Ylimaunu 2007). It has been followed by three additional doctoral theses based on the material from Tornio and another three focused on Oulu (e. g. Kallio-Seppä 2012; Nurmi 2011; Puputti 2008). Most of these scholars from the University of Oulu had absorbed influences from American historical archaeology and material from these early modern northern towns entered broader international discussions regarding colonialism, globalisation and modernisation.

Until the 2000s, urban archaeological research in Turku focused on the medieval town rather than the later phases. Even though urban archaeology has a long tradition in Turku, no doctoral theses focusing on urban archaeology existed before the 2000s. This has changed since 2008, and today there are half a dozen dissertations (e.g. Harjula 2008; Seppänen 2012; Tourunen 2008), most of which have analysed material from a single extensive excavation with exceptionally well-preserved organic material; namely, the Åbo Akademi site (1998). Doctoral dissertations analysing the early modern town are still missing, but this will change in the near future. Urban archaeology is also an ongoing doctoral research topic at the University of Helsinki.

Early modern urban archaeology in Finland got a boost in 2018–2022 when Muuritutkimus Ltd/Kari Uotila excavated the area of Kauppatori (Eng. Market Square) in Turku (Uotila et al 20021; Uotila et al 2024). These were Finland's hitherto largest urban excavations and offer much potential for future research. The excavated area covered about 20,000 m^2 and more than twenty plots. The site was part of a large new town area that had been planned and settled after 1640.

Challenges

In the 1990s, the National Board of Antiquities and different provincial and town museums conducted all the urban excavations. The first private companies in the field of archaeology were founded around 1990. Initially, their share was modest, but they currently conduct practically all the developer-funded watching briefs and excavations in urban areas. Today, all contract archaeology is based on competitive tendering. In Finnish practice, it is the developer who chooses the company which will carry out the archaeological fieldwork rather than the antiquarian authorities. Unfortunately, price is consequently usually the deciding factor when choosing the winning offer. Competitive tendering between the companies making offers leads to the minimising of costs, which creates pressure to lower standards in fieldwork

and documentation. It is often hard to maintain high standards in these circumstances even if the control and supervision of all archaeological field work are in the hands of the FHA and the responsible district museums.

Urban excavations, especially in early modern contexts, often produce vast numbers of finds which creates challenges with regard to conservation, reporting, and storage. Some local museums were previously able to introduce the excavated finds to their collections. However, in addition to the Finnish National Museum, only the City Museum of Turku acquires new finds today.

Scientific archaeology has in many ways been neglected in Finland. In practice, only the three universities have invested in scientific archaeology, but resources have been limited compared to the other Nordic countries. In the past, the National Board of Antiquities hardly ever encouraged scientific sampling, and even today it does not offer any resources for storing samples for future research. Consequently, the general absence of scientific archaeology impedes all scientific sampling and analysis during the fieldwork. This affects the practices followed in contract archaeology. Companies have different standards, and only a few invest in scientific archaeology. On the other hand, one of the companies follow the latest developments on the frontline of modern technology related to archaeological documentation. Unfortunately, the NBA/FHA has been slow in developing methods for preserving the digital documentation. As late as the 2010s, all the reported documentation was digitised and archived only as paper prints. Lately, they have been digitised in PDF format. However, due to this process, most of the original digitised data was lost. Today, most archaeological reports are accessible online via the Kyppi service, but it is challenging to get an overview of the urban archaeology conducted in Finland. Many reports are still missing, and data-harvesting tools are hard to find. However, the FHA and the universities currently share a common desire to get the existing old material and new data flowing from the field and laboratories into an easily accessible standardised form.

The state of urban archaeology in Denmark

There are 76 medieval chartered towns in present-day Denmark. Their sizes vary, and compared to European cities, they were rather small. In the first census from 1672, the smallest town is Sakskøbing in Falster, with 272 inhabitants, while Copenhagen is the largest, with 41.000 inhabitants. Since Copenhagen became the permanent residential city for the king in the 15th century, it outgrew other Danish cities. It became significantly larger than the second-largest town, Aalborg, for instance, with its 4181 inhabitants. The large number of chartered towns and their significant variation in size make Danish urban archaeology a very varied field.

Archaeological observations have been undertaken in Danish towns since the 19th century, but it was not until 1969 that the first law providing a legal framework for archaeological activity was established (The Nature Conservation Act). This, along with the establishment of a university course in medieval archaeology in the 1970s, meant greater attention was paid to the potential of urban archaeology and led to an increase in the number of archaeological excavations. However, the trend does not apply to all towns. Since archaeological excavations are usually only undertaken in relation to construction work, the general economic situation affects the number of excavations, resulting in fewer excavations in towns in areas with low economic activity. Moreover, there seems to be a contagion effect, meaning that if there is an awareness of the value of archaeology in a town and a cultural-historical museum is present, there is more excavation activity. However, it is difficult to find hard data to support this assertion. This bias means that more is known about the few bigger towns and less about the history and development of the many small towns.

A database of cultural heritage and excavations was initiated in the 1980s. In 2009, it became the online service *Fund & Fortidsminder*. Despite this initiative, data access and sharing are still a massive challenge in Danish archaeology. In 2008, a digital documentation and administration system was introduced (MUD - Museernes Udgravningsdata); however, the system was built for open-area excavations, which made it less ideal for urban excavations. Some museums, such as the Museum of Copenhagen and Museum West, have their own databases – perhaps for that reason. A new national system for searching across collections (SARA) is on the way, but its primary focus is on finds and it

will not solve the problem of limited access to excavation data. It is problematic that the Danish database systems seem to maintain a perspective that sees excavations as a technical activity focused on producing an objective dataset for the museum archives and not for facilitating synthesis across administrative borders. Moreover, the differences between museums regarding digital overview have only increased since the 1980s. Not everyone has a digital overview of their excavations, and finding or applying for money to reduce the backlog of data is difficult, even though such an overview is fundamental for producing meaningful new knowledge about the past to benefit the public.

A better data infrastructure is needed in the future because current focus is on the individual town and selected case studies, and less on facilitating making comparisons and drawing overall conclusions.

Developer-funded archaeology and large excavation projects are driving urban archaeology forward

A new Museum Act was introduced in 2001. The act introduced developer-funded archaeology, and as a result, the number of small and large excavations increased. In 2009, an international review of Danish archaeology criticised the standard of documentation and lack of research based on the source material generated by the new legislation. After the 2009 review, demands for museums to improve registration standards and to conduct research increased. One result was the launch of national strategies for all archaeological periods and subjects, such as funerary archaeology and urban archaeology, for example. The strategies were developed by representatives from museums and universities and are currently being evaluated and updated. At the same time, many small museums merged into larger units – the number decreased from forty to twenty-seven, all with regional archaeological responsibility. The larger archaeological units enable investment in up-to-date software and hardware such as drones and GPS equipment. In 2024, the current Museum Act was revised, and with that the requirement to do research based on archaeological material disappeared – to the surprise of many Danish archaeologists. Only the future will show if that means a decrease in the research output in Danish archaeology.

During the 2010s, only one research-led excavation took place (The Northern Emporium Project). However, several major urban archaeological excavations were undertaken in connection with infrastructure projects. Examples are the Metro Cityring in Copenhagen, the transformation of the city centre in Odense, the remodelling of the area around the Cathedral in Ribe, Helsingør Docks and the urban renewal project *Køge Kyst*. This has led to the development of excavation methodology (the 'single context' method has been more commonly used), natural scientific sampling on a whole new level, digitisation, problem-based archaeology, and, not least, a vast increase in source material and documentation material. Some of these excavations have led to large research projects, including PhD scholarships, but it remains problematic that research and public outreach are not covered by developer funding. It is consequently up to the museums to apply for external funding for research and dissemination. There are opportunities for funding through private funding bodies, but the competition is tough, and the application process is resource-demanding in terms of time and money.

Research into urban archaeology

In the 1970s, the Danish *Projekt Middelalderbyen* (Medieval Town Project) set out to map the knowledge and archaeology of selected medieval towns. Emphasis was placed on the towns' administrative, functional, legal, economic, and political aspects. This resulted in attention to special purpose buildings and structures (churches, town halls, guild halls, etc.), fortifications, market squares, craft production (the presence or absence of a craft) and trade (presence/absence). These elements are central to the *bundle criteria* often used when defining towns. The late 1970s also came with an increased focus on applying natural sciences to the archaeological source material. It was not until the early 2000s that Danish archaeology started including post-processual archaeological research agendas. It could be defined as a *relational turn* or even a *theoretical turn*. The relational agenda did not replace the processual agenda but existed in parallel. Still, the focus has shifted towards social processes, networks, urban identity, and practices. The questions were related to the following: What do people and towns do? Emphasising

the *processes* related to craft production, trade, buildings, and structures.

In 2014, Kristian Kristiansen described the progress in natural science as a third science revolution, and the natural sciences have again taken the stage in archaeological research (Kristiansen 2014). One initiative that aims to integrate social and network perspectives of archaeology with natural sciences is the Centre for Urban Network Evolutions at Aarhus University, a Centre of Excellence founded in 2015 by the Danish National Research Foundation. The centre explores the evolution of urbanism and urban networks and has introduced the concept of *High Definition Archaeology* (Raja and Sindbæk, 2018). High Definition Archaeology can be defined as a method that integrates scientific data with archaeological and historical interpretations (Raja and Sindbæk, 2024). This requires precise chronological control and a contextual understanding of social spaces and depositional processes. The approach makes it possible to create detailed and precise analyses of archaeological finds and their contexts, which can provide deeper insights into past societies and their development.

Even though much has happened regarding research into urban archaeology in Denmark over the past 30 years, a quick overview shows that this has mainly involved eight large towns. The exception is Søborg, which can be characterised as a small medieval town that had its rights as a chartered town removed already in the 14th century. Søborg was initially part of *Projekt Middelalderbyen*, but the work was never finished. A plan to recreate Søborg Lake has made the archaeological and historical overview relevant again, and after more than 30 years of hibernation, the publication is on its way.

Future possibilities and challenges

So, where do we go from here? The demands on Danish archaeologists to conduct research and participate in public discourse regarding urban development are increasing. Using archaeology to add historical value to the present and future urban landscape is undoubtedly an important way to show the relevance of archaeology in a larger societal context. This presents new opportunities and challenges, new collaborations, and perspectives.

For instance, the urban archaeological field keeps expanding with the development of post-medieval archaeology, which includes new types of urban archaeological sites: harbours, waterfronts, industrial sites, military structures, and cemeteries. Including recent periods and new types of sites calls for new questions, critical evaluation, and possibilities concerning archaeology's potential and role in the public discourse.

The expansion of the urban research field also means that we pay more attention to the variation between cities and towns: what is the urban nature of the small towns, and is there an overlooked potential for our understanding of urban environments and urban life? The potential of the natural sciences is also expanding. However, at the same time, signs show that the balance between the humanities and natural sciences is under evaluation and that the research agenda is increasingly set by archaeologists who have an insight into both areas.

The nature of developments over the last 30 years of urban archaeology means it is challenging to keep up with the massive amounts of new source materials that are being created. At the same time, digitisation gives new opportunities to investigate old materials in storage and archives and creates challenges when putting the new and the old together. This will be a challenge and provide many new possibilities for research in the upcoming years. It is crucial to create infrastructures and conditions that encourage synthesis across administrative and mental borders to create new insights about the past and not just fill up databases and archives with information and finds.

The state of urban archaeology in Norway

Norway's current Cultural Heritage Act provides for the exemplary and comprehensive legal protection of prehistoric and medieval archaeology. However, it does not extend the same level of protection to archaeological terrestrial deposits that post-date the Norwegian Reformation in 1537. This means that deposits and structures of post-medieval date in Norway's medieval and later towns and cities can be removed and destroyed without archaeological documentation, and that, with some exceptions, museums are not legally obliged to curate artefacts that post-date 1537. This sharp conservation divide at 1537 distinguishes Norway from its Nordic neighbours.

Given the legal restrictions, the administration and practice of urban archaeology has been primarily focused on medieval towns and cities. Medieval urban centres are automatically protected by law and legally defined as distinctive bounded heritage environments. Any activity requiring disturbance of the ground is subject to approval by the cultural heritage authorities; in some cases, Riksantikvaren (the national Directorate for Cultural Heritage), and in others, the relevant county administration. Where approved, statutory excavations are usually developer-funded and are not subject to competition between institutions or private companies.

The planning and running of excavations in medieval towns, church sites and castles was transferred from Riksantikvaren to the newly-established Norwegian Institute for Cultural Heritage Research - NIKU for short - in 1994. NIKU has offices in the main medieval cities from which excavations are run. The regional museums do not undertake excavations in the towns and cities but are responsible for curating the medieval artefacts deriving from them.

Riksantikvaren has adopted a more restrictive conservation policy in the last 30 years, prioritising *in situ* preservation. Nonetheless, since its establishment in 1994, NIKU has conducted hundreds of watching briefs and variously sized excavations in all the larger medieval cities. Several large-scale and long-running excavations connected with major urban infrastructure and renewal projects in Oslo (e.g. Bjørvika, Follobanen) and Trondheim (Torvet, Katedralskolen) have engaged and developed much of NIKU's expertise in recent decades.

Methods revolution and professionalisation

In the last 30 years, there has been a qualitative paradigm shift regarding excavation methods and practices. The 'single context' method was introduced to Norway in 1992 during excavations at the Archbishop's Palace in Trondheim, possibly the first place it was used systematically in Scandinavia (Nordeide 2000). This was followed by the introduction of digital site recording methods during the 2000s. This has led to the production of complex digital site records with great potential for integration and manipulation in post-excavation. However, it has also increased the volume of digital data requiring processing, storage, and curation, with all the consequences and problems that entails. Excavation practices have also been significantly professionalised in response to challenging developments in the working environment. In contrast to earlier decades, excavations are now routinely conducted on a year-round basis with the use of heated tents. Excavators must take greater regard for the demanding technical conditions and hazards on construction sites and adhere strictly to rigorous health and safety routines. The recent number of large-scale projects has established a large pool of well-trained excavation staff recruited from students and graduates, replacing an earlier reliance on skilled excavators imported from Britain and Scandinavia.

During the past ten years or so, NIKU has improved and expanded its environmental sampling procedures in step with the recent qualitative developments within the environmental sciences. There is now a greater emphasis on an interdisciplinary approach to gathering and analysing scientific data, and where possible, specialists are employed on-site. However, budget restrictions limit the scale and range of analyses, and prioritisation is required in all areas. Furthermore, the reporting of excavations is restricted to the production of so-called technical reports, which cannot include any form of analysis deemed to have arisen as a result of research, for which the developer is not required to pay. Consequently, any interpretation offered in an excavation report must draw primarily on the testimony of basic field documentation and environmental analytical results and is provisional in nature.

A methodology of particular importance in Norway, which NIKU has developed in cooperation with Riksantikvaren and other institutions, is the environmental monitoring of archaeological deposits. This originated with the recognition that deposits under the historic buildings at the World Heritage Site Bryggen in Bergen were subsiding due to groundwater drainage, and that changes in preservation conditions and the resulting degradation of organic archaeological deposits were likely to be a national problem. A national monitoring programme is now in place, and NIKU has been instrumental in formulating mitigation strategies and an international monitoring standard (NS-EN 17652:2022 Cultural heritage - Assessment and monitoring of archaeological deposits for preservation in situ).

NIKU is also a leading actor in the field of geophysical surveying, although this has had little impact in urban contexts. However, ground-penetrating radar may provide a useful supplement as the methodology is refined in the future.

NIKU has recently improved public and professional access to its reports by digitising them and providing a link to the report database on its website. Excavation budgets and NIKU's resources do not allow for the publication of monographs or other forms of professional dissemination, and Riksantikvaren has no publication series devoted to disseminating information from urban archaeological investigations. Likewise, no official funding is available to undertake what many regard as a critical necessity – namely, the production of syntheses and comparative analyses of the archaeological data and knowledge produced within individual medieval towns and the group of medieval urban centres as a whole. In 2015, Riksantikvaren published a professional programme that defined the main areas of professional interest and the criteria and themes to be addressed in the planning and execution of excavations in medieval contexts (Johannessen & Eriksen 2015). However, this requires revision and would benefit greatly from a synthesis and review of the results of the last 20-30 years of activity.

In recent years, NIKU has established a more professional public outreach programme. This takes place online on its main website and dedicated local social media sites, in face-to-face encounters, on-site tours, and other public events, as well as through multiple media channels, popular scientific publications, and the production of virtual models, for example. This heightened engagement with a knowledge-hungry public is vital to promoting, cementing and legitimising NIKU's relationship with people and society, both locally and nationally.

Recent excavation results and research

The past 30 years of excavations in Norwegian medieval towns have produced a huge volume of new data and knowledge, only a fraction of which can be briefly mentioned here (cf. Nordeide 2000, Hansen 2005, Cadamarteri et al 2020, Christophersen 2020, Cadamarteri et al 2022, Bauer et al 2024). More emphasis has been placed on documenting the pre- and early urban landscape, and greater insight has been gained into urban morphology and infrastructure in all towns, with more extensive areas of urban plots and streets uncovered, most notably in Oslo. Varieties of timber buildings have been excavated, while our conception of medieval Oslo as being predominantly timber-built has been modified recently by the discovery of the foundations of a number of medieval stone buildings near the Bishop's palace. Buildings and structures at royal and ecclesiastical sites have been investigated in a number of towns, as have numerous churches, graveyards and graveyard populations. Areas of urban crafts and industry – such as metalworking and tanning – have been documented in urban peripheries, as have urban field systems. In Oslo, technically challenging excavations conducted by NIKU and the Norwegian Maritime Museum at the waterfront have produced well-preserved remains of massive timber-built wharves, sunken vessels and finds-rich deposits which have cast new light on Oslo's thriving medieval and post-medieval maritime activity (Bauer et al 2024). And not least, a huge number and diversity of objects have been recovered, which provide insight into numerous aspects of daily life and urban practices.

While NIKU is actively engaged in research into the comparatively new fields of environmental monitoring and digital archaeology, research into the historical urban phenomenon itself and the material produced by decades of excavation has been comparatively subdued. Whereas much ground-breaking research into urbanisation was undertaken in the decades prior to 2000, most of NIKU's energies were subsequently devoted to dealing with the volume of excavations and methodological developments associated with them. Research has also been handicapped by a lack of collaboration between the institutions involved in the field, namely NIKU, Riksantikvaren, and the universities and museums. The necessary alliance between managerial, theoretical and empirical strategies and approaches was not sufficiently developed. Matters are compounded by the high degree of competition for funding from the Norwegian Research Council, the main source of funding for humanities research in Norway.

However, research activity and knowledge production have been re-energised in recent years, drawing on the range of empirical data noted above, and the recent theoretical developments described in the previous sections. Re-

searchers at universities, museums and NIKU have published academic articles and books dealing with aspects of urbanisation and urbanism, as well as books for an informed public (e.g. Hansen 2005, Cadamarteri et al 2020, Christophersen 2020, Cadamarteri et al 2022, Bauer et al 2024). New theoretical frameworks and research topics focusing on social practices and processes, networks, urban life and urban identity are taking root, often in alliance with environmental scientific data and analytical results. In an effort to activate old and new urban material and engage its staff in research, NIKU recently funded a research project into early urbanisation called Urban Origins, which examined the roots and character of urban centres in Norway by focusing on particular processes and practices which emerged there. [1] The project built on a more recent emphasis on gathering data about the pre-urban landscape and settlement, as well as previously under-explored areas such as cultivation horizons and the urban periphery. It also re-examined material from older excavations with the help of new methods and theoretical approaches, with the aim of establishing a model for future research. A major research project which also seeks to reactivate old excavation material is the Borgund Kaupang Project run by Bergen University Museum which aims to examine the archaeology of economic and other aspects of the abandoned medieval town.[2] NIKU has also led a major interdisciplinary research project which investigated the problems associated with the current conservation divide set at 1537 and the knowledge potential inherent to post-medieval archaeological material. Its results have informed the work of the government commission currently preparing Norway's new Cultural Heritage Act (Fagerland & Paasche 2011, Paasche 2016, McLees 2019).

Future challenges

At the time the paper which forms the basis for this section was delivered at NUA 2023, the principal future challenges facing urban archaeology in Norway were identified as uncertainty regarding whether the new Cultural Heritage Act will keep 1537 as the limit for automatic protection for archaeology and whether NIKU will retain responsibility for conducting statutory urban excavations. The government commission preparing the new Cultural Heritage Act - or Cultural Environment Act as it will be called - delivered its report for consultation in March 2025 (NOU 2025:3 Ny kulturmiljølov)[3]. NIKU's and others' exhortations regarding the urgent need to extend automatic protection to post-medieval archaeology have been heeded, although two different dates have been proposed as a new chronological limit for protection: namely, 1650 and 1850, the former being the option supported by the commission majority. However, the commission has stated unanimously that responsibility for planning and conducting statutory excavations in towns, church sites and castles should be transferred to the regional university museums. If this change is ultimately enacted, NIKU will in the near future cease to be a practitioner of - and centre of specialist expertise in - urban archaeology.

Urban archaeology in Norway consequently finds itself at a crossroads. The proposed extension of legal protection to encompass post-medieval urban archaeological deposits is welcome and long overdue, although the precise chronological, legal and administrative frameworks remain to be decided. The transfer of excavation responsibilities to the museums will result in the dissolution and dispersal of the knowledge and expertise currently gathered in NIKU, which, if not skilfully and strategically managed and coordinated, could impact negatively on the practise of urban archaeology locally and nationally. Consequently, the process of transition must rigorously secure continuity and the existing body of data and professional expertise locally and nationally, as well as the maintenance of a meaningful national professional engagement in the development of the field of urban archaeology, including its management, site methodology and research. Conscious efforts must be made to ensure that methodological advancement and the volume and quality of research and dissemination are maintained and continue to increase, preferably in close collaboration with Nordic colleagues. Our region's shared disciplinary and theoretical traditions and practices, and the commonalities and differences in our distinctive collective geo-historical body of urban material provide for a rich variety of themes and research questions which can contribute greatly to wider regional and global understandings of the urban phenomenon.

A common Nordic Urban Archaeology?

As this overview reveals, it is clear that urban archaeology in the individual Nordic countries shares some similarities regarding its research history and general development. It is also clear that differences in legislative frameworks, scholarly traditions and the history of urbanisation between countries have created differences in emphasis regarding which periods are investigated and studied in urban archaeology. While the cities of the modern era and the early modern remains in towns are a customary concern of urban archaeology in Sweden and Finland, there is currently no legal protection for post-medieval urban archaeology in Norway. In Denmark, the law does distinguish between periods, but the entrenched archaeological tradition has led to the archaeology of the early modern and later periods being overlooked and under-prioritised.

The most significant difference between the Nordic countries is in the administration of archaeology. While all archaeological activity is developer-funded, archaeology is managed and organised differently in every country: from the Danish situation where regional museums conduct archaeology, to Norway where a single organisation currently conducts all excavation activities in the medieval towns (though this might change in the near future), and finally to Sweden and Finland, where excavations take place within a competitive tendering framework. These different ways of organising archaeological activities all have their pros and cons. However, it also means that there are very different systems and experiences to consider and learn from when the administration of archaeological activities inevitably changes in the future.

The challenges facing urban archaeology seem quite similar across national borders. The amount of data being produced is rising, and the need to digitise older excavations and curated finds material is crucial everywhere. Moreover, in terms of funding, archaeological activities are often regarded as being limited to excavation activities and excludes concomitant requirements such as the processing of data and conducting comparative analyses (diachronic and synchronic). Consequently, there is increasing frustration regarding the lack of production of deep knowledge and syntheses of large amounts of available data.

Implementing new technologies and new scientific and archaeological methods seems to be equally important across the Nordic countries, and perhaps this is one of the areas where sharing experiences and know-how holds considerable potential. Archaeology – urban archaeology – is a minor player in developing technical solutions and new methods. However, by joining forces across nations, it may be possible to influence the development of technologies and make it more interesting for companies to invest in the development of technologies simply by forming a larger customer base.

Even though research into urban archaeology faces challenges in all Nordic countries, it is encouraging to see that new research projects are still being developed, and new questions are being asked about new and old material. Because of our geographical closeness and cultural and historical interwovenness, theoretical approaches and research agendas seem to develop in tandem, potentially creating synergy. If we continue to share ideas and results generously and perhaps also develop cross-national research projects, Nordic urban archaeology has the potential to continue to produce excellent results and set the agenda in archaeological research on an international level.

What questions will we ask regarding urban archaeology in the future? What new agendas lie ahead?

As has been hinted at in the present overview, there are some tendencies towards themes such as the urban periphery, the pre-modern and later-historical towns, the continued integration of the natural sciences, and the urban-rural relationship. However, this is not at all exhaustive, and hopefully the papers following this introduction will indicate some exciting future avenues. Moreover, it is our wish that this conference and future Nordic Urban Archaeology conferences will support and foster more mutual inspiration and synergy within the field of urban archaeology across the Nordic countries.

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Fig. 1. Excavations at the City Hall Square in Copenhagen in 2011. Photo: Museum of Copenhagen.

Notes

1 https://www.niku.no/forskningsprosjekt/urban-origins-archaeologies-of-urbanisation-and-urban-life-in-early-medieval-norway/
2 https://www.uib.no/en/rg/borgund-kaupang
3 https://www.regjeringen.no/no/dokumenter/nou-2025-3/id3092679/

Intersectional Identities in Urban Households

By Annika Nordström

Introduction

The enduring interest in objects and material perspectives has profoundly impacted archaeology since the post-processual discourse in the 1980s (Tilley 2006). One outcome of seeing the material culture as active and meaningful is that it stimulated and accelerated the widespread growth of medieval and post-medieval social archaeology (Gilchrist 2009). As archaeologists, we are making sense of a fragmented and fractional past where traces of social practices of everyday life in a multidimensional time/space framework make up our primary pursuit. When studying urban sites with complex stratigraphy, we depend upon informed excavation methods, multidisciplinary collaborations, and theoretical perspectives (e.g. Larsson 2006; 2017). Recent research in urban archaeology has increasingly focused on social aspects of urban life, approaching towns as social spaces that are created and recreated by actions, practices, negotiations, and interactions (e.g. Larsson 2006; Christophersen 2015; Jervis 2016; Larsson 2017; Dahlström 2019; Haase 2019a; McLees 2019; Kjellberg 2021). A common ground for such research is to view urban places as the result of the interaction between the agency of people and the surrounding materiality and that it is in the intersections of differentiated interactions that everyday life emerges (Haase 2019b: 43 with refs.). Within Nordic urban archaeology, the theme of the present anthology, there seems to be an overwhelming consensus on approaching the town as a social phenomenon.

Issues related to cultural, ethnic and social identity analysed through material culture have been addressed by several researchers (e.g. Carelli 2001; Roslund 2001; Gaimster 2005; Immonen 2007; Mehler 2009; Roslund 2009; Gaimster 2014; Hansen et al. 2015; Roslund 2018; Haase & Hammers 2021; Kjellberg 2021), though many issues still require more attention in our pursuit of humanising urban space. For example, gender perspectives are often mentioned in declarations but rarely constitute the central scope of urban archaeological research (Tagesson 2019: 39). The published work by Mygland (2007, 2023) and Hansen (2010) on women and material culture in Bergen are important execptions. Their work demonstrates that new aspects of urban life and urbanisation can be gained by focusing on previously overlooked research issues, such as gender roles.

In this paper, issues of intersectional identities are analysed in relation to material culture in urban households. Intersectional identities refer to the complex and overlapping social categorisations that shape an individual's experiences and perspectives. For example, gender is a core component of social identity, intersecting with other identity categories such as age, ethnicity, and class/socioeconomic status, thus expressing different power and social relations (Lykke 2005). Analysing overlapping social identity categories offers an enhanced understanding of complex social dynamics. Understanding intersectional identities from contextually specific material practices in urban households calls for qualitative analyses of the materiality.

The objective is to demonstrate how relational post-humanist approaches to material practices combined with biographical perspectives on objects offer a methodology that increases our understanding of the interconnectedness of material culture and individuals in forming, maintaining and changing intersecting identities such as gender, ethnicity and status.

In the following, I will briefly define the concepts of relational approaches and the household as an analytical unit. Subsequently, two case studies from two different urban households are presented. In the first case, I analyse gender and ethnicity through personal items found in medieval households in Nyköping (fig. 1). In the second case, different types of flowerpots from Carl Linnaeus' 18th-century household in Uppsala are analysed in relation to class/socioeconomic status. The purpose of the very different case studies is, among other things, to underline that enhanced interpretation of material culture benefits our understanding of social complexity in urban households, regardless of available source material on, for example, household members.

How things come to matter – relational approaches

The importance of theorising material and materiality has grown in archaeological research during the past two decades. The complex and fundamental position of materiality in various inter- and intra-relational processes and several ways to understand this is widely recognised (e.g. Arwill-

Nordblahd & Back Danielsson 2021: 160ff. with refs.). Karen Barad's (2003; 2007) theoretical model of agential realism has been influential in these discussions. It offers a way of understanding the world where the universe comprises phenomena that are the ontological inseparability of intra-acting agencies. The key concept here is *intra-action*. Unlike the more traditional concept of *interaction,* which presumes independent entities' prior existence, Barad (2003: 821) describes intra-action as the mutual constitution of entangled agencies. In her agential realism model, all phenomena (objects) can play different roles, and the outcome is uncertain. What matters is that human's relationship with their material surroundings is relational in all aspects and is *performed* through intra-activity. Despite how we define gender and identity categories, any engendering practices are not only discursively fashioned and performed but bodies in themselves that "come to matter through the world's iterative intra-activity" (cf. Butler 1993; Barad 2003: 824) – through its performativity (see also Christophersen 2015: 114; Jervis 2016: 392 on performing towns and urbanism).

Barad's agential realism is stimulating because it allows archaeologists to approach material assemblages and human practices as ongoing relational processes *and* bounded entities that constitute each other through their intra-actions (Fowler & Harris 2015:2f, 9). Barad's feminist posthumanism rethinking of performativity and of the world itself pushes toward an understanding of materiality as "*either given or a mere effect of human agency*" but rather as "*an active factor in processes of materialisation*" (Barad 2003: 827), thus focusing on facets on becoming instead of static being.

Such approaches call for a biographical perspective when analysing engendering processes in multidimensional time/space contexts. The interplay between people, objects, and social practices can be highlighted by studying the material in relation to their life cycle. Studying how objects have been produced, used, and discarded and their social and cultural context allows us to explore various engendering practices and changes related to the objects. Such an approach enhances the analysis of collective identities and material practices of everyday life (Gosden & Marshall 2009: 169; Gilchrist 2012: 11ff.).

Spatial scale – the household

Social archaeology deals with everyday life and often targets the *household* as an analytical unit (e.g. Meskell & Preucel 2004; Gilchrist 2012). The composition of households and their meanings has shifted throughout history, and there are multiple differences to consider, not only in time and space but also socially and culturally. Therefore, the household concept requires careful reflection on its social and physical parameters. As we shall see, the households considered in this paper are embedded in very different circumstances and contexts, not only regarding their social and cultural settings but especially in access to available historical sources regarding individuals in the households. Such discrepancies are essential prerequisites for making plausible interpretations from the gathered material concerning household identity categories and their intra-actions.

The household in pre-industrial society was the residential centre of consumption and production. Family implies close kinship ties, while household is a broader concept associated with function and co-residency, implying shared dwelling spaces. Households were usually established upon marriage, with a married couple at its core. Apart from the husband and (house)wife, the household residents could include children, servants, apprentices, guests, and other non-family members. The household concept, thus, is made up of individuals of different engendered categories but with shared cultural connotations. The status of the individuals within a household depended on gender, age, duties within the household and affiliation to the head of the family. As household members intra-act – economically, socially, and culturally – they engage in engendering processes that create and recreate this social unit (Schmidt Sabo 2006: 115ff.; Gilchrist 2012: 114f.; Phil 2011: 35f.).

Access to medieval archival sources disclosing information on individuals who lived and/or owned a particular plot in a town is scarce, at least for Swedish conditions. This fact makes it challenging to reconstruct individuals and family ties within specific households, especially concerning the period 1000 – 1500 CE. Access to available sources is significantly better from the 17th century onwards. In such archives, households often can be identified with the name of the head of the family and the name of the plot, thus making identifications possible. Deviations from

Fig. 1. The locations of Uppsala and Nyköping are marked with red dots: Henrik Phil, National Historical Museums.
Uppsalas och Nyköpings lägen är markerade med röda prickar.

the norm described above, however, occur frequently. Combining historical and archaeological sources thus can be more complicated than often assumed (Lindström & Tagesson 2015; Larsson & Rosén 2020).

The household function was concerned with production, consumption, reproduction, and socialisation, a manifestation of the materiality of everyday life and, as such, can be interpreted archaeologically and analysed from various aspects and perspectives. In this study, the intra-action between different social identity categories such as gender, ethnicity, and class in relation to objects and material and social practices are in focus.

As mentioned, the first case study is based on results and interpretations from a large-scale excavation in central medieval Nyköping. The second case is based on a small-scale excavation of parts of the 18th-century home of the famous Natural Scientist Carl Linnaeus in Uppsala (fig. 1).

Gender and ethnicity in medieval households in Nyköping

During 2010 and 2011, large-scale excavations were conducted in the Åkroken block in the city centre of Nyköping, situated near the river Nyköpingsån. The excavations resulted in a large assemblage of objects and structures, dating from the mid-7th century to the early 18th century, with a regulated town plan laid out sometime in the late 11th century. The excavation included parts of seven identified plots (fig. 2). The project had an interdisciplinary approach, which required close collaboration between the archaeologists and other scientific specialists, not least

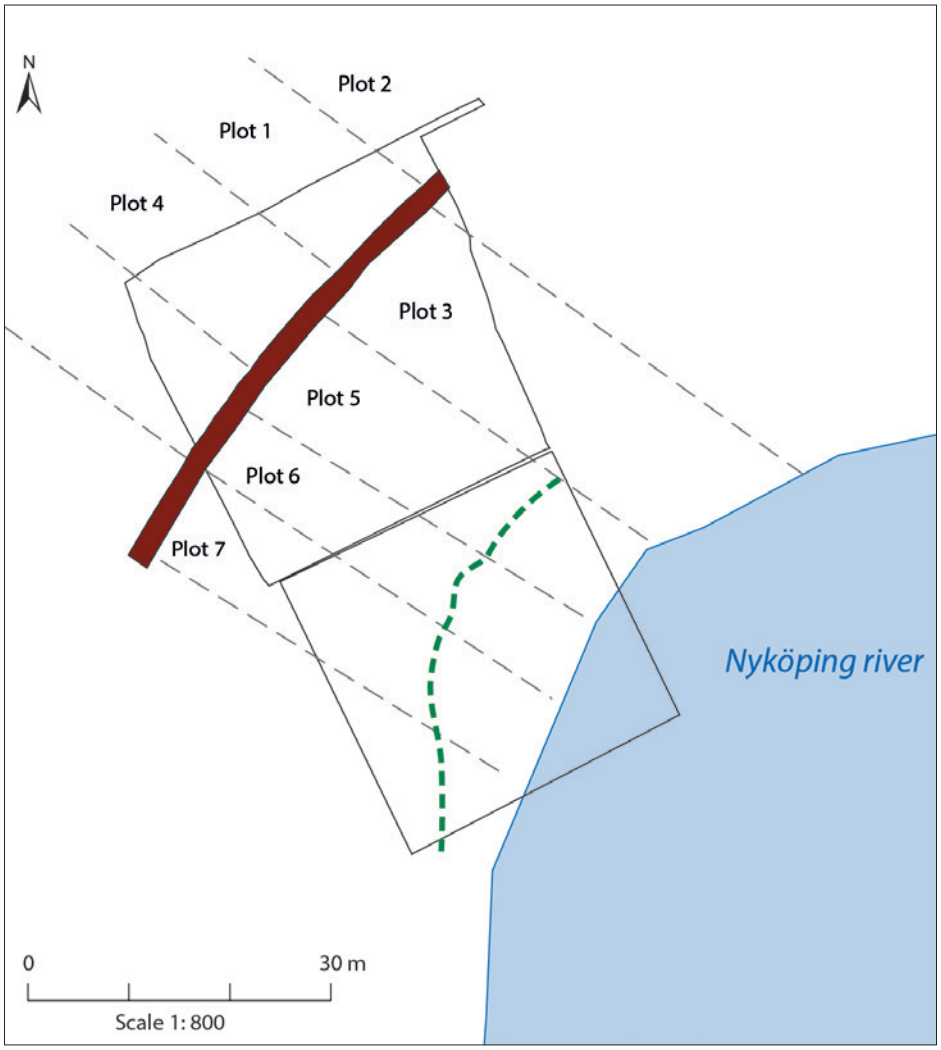

Fig. 2 Schematic plan drawing of archaeologically identified plots in Nyköping. Brown= Street. Green dotted line= a slope facing the Nyköping river. Henrik Phil, National Historical Museums.
Schematisk planritning över arkeologiskt identifierade tomter i Nyköping. Brun = Gata. Grön streckad linje= en sluttning mot Nyköpingsån.

during the actual fieldwork, which resulted in added value to the interpreted source material, enabling detailed analyses of everyday practices in a complex stratigraphy (Nordström & Lindeblad 2016: 32f.).

In the case of Åkroken, few archival sources are available, and the spatial demarcation of the households is decided from the archaeologically identified plots (fig. 2). As always, several issues regarding representativity must be considered. For example, the excavation did not cover complete plots. Plots numbers one to four and seven were fragmented, while plots five and six were more intact.

Out of the roughly 12,000 individual objects found in the excavation, approximately 4% was made up of small finds (Nordström & Lindeblad 2016: 113f). In this case, what I refer to as small finds include personal objects that occur infrequently on the site. Generally, personal adornment and other accessories are included when categorising such items, for example, items that have been personalised through alteration after manufacture or exhibit the owner's mark (MacDonald 2016). The infrequent appearances of this object category mean that small finds often defy the larger-scale distribution pattern analyses and statistical applications of more commonly occurring object categories. Analysing rare small finds thus requires special attention to each item's social context and biography. In the current case, traditional typology has been used to determine the object's provenance.

In the following section, I will discuss (predominantly) female dress accessories and glass rings concerning gender and ethnicity issues. In various degrees, the chosen objects can be linked to individuals as well as cultural and ethnic attributes.

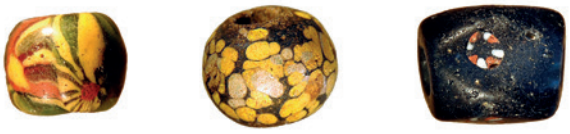

Fig. 3. Examples of some of the more exclusive glass beads in Nyköping. From left to right, F7898 found on plot 5 (1140-1160 CE). F7897 found on the street adjacent to plot 6 (1125-1140 CE). F7894 found on plot 1 (1090-1125 CE). Photo: Mathias Bäck, National Historical Museums.
Exempel på några av de mer exklusiva glaspärlorna i Nyköping. Från vänster till höger, F7898 på tomt 5 (1140-1160 e.Kr.). F7897 finns på gatan i anslutning till tomt 6 (1125-1140 e.Kr.). F7894 hittades på tomt 1 (1090-1125 e.Kr.).

Glass beads

Beads made up a major part of the personal accessories found in Nyköping. Of eighty-two beads, sixty-eight were made of glass (fig. 3). Glass beads are traditionally attributed to female-gendered individuals as part of their dress during the Scandinavian Viking Age. However, they also occur in male-gendered burials in Scandinavia, as well as in Britain and Russia (e.g. O'Sullivan 2015). As can be seen in Table 1, most of the glass beads have been contextually dated between 1125 and 1230 CE. Most of them were found in two different households, plots no five and six (fig. 2, Nordström in prep.). Monochrome beads are most common (fifty-four); the other forms only occur in four – eight numbers (table 1). Most of them were found in two households, plots no five and six. Three (of four) gold foil beads were found on plot no five (fig. 2, Nordström in prep.). Parallels to the Nyköping bead types have been found in, for example, Gotland, Sigtuna, Finland and Novgorod. With few exceptions, the glass beads share traits with material found in the Baltic area during the late Scandinavian Viking Age (Bäck 2016: 145f., with refs.).

Technique→ / **Dating↓**	Monochrome	Polychromed	Millefiori	Gold foil	Sum/phase
Phase 3:1090-1125	2	1	0	0	3
Phase 4: 1125-1140	2	3	1	1	7
Phase 5: 1140-1160	6	1	3	1	11
Phase 6: 1160-1200	13	2	0	0	15
Phase 7: 1200-1230	20	0	0	1	21
Phase 8: 1230-1260	2	0	0	0	2
Phase 9: 1260-1290	2	0	0	0	2
Phase 10: 1290-1330	0	0	0	0	0
Phase 11: 1330-1400	3	0	0	0	3
Phase 12: 1400-1450	1	0	0	0	1
No context	1	1	0	1	3
Sum/technique	**54**	**8**	**4**	**4**	**68**

Tab 1. Compilation of glass beads (n 68) according to number per production technique and number per phase (after Nordström in prep.).
Sammanställning av glaspärlor (n 68) efter antal per produktionsteknik och antal per fas.

Beads appear relatively frequently in Scandinavian medieval towns. In Sigtuna, Sweden, more than 2,000 beads have been recovered from various excavations (Jönis 2019: 27). In Lund, Sweden, beads are common in the deposits from the town's earliest phases. Salminen (1996, 1998) studied these beads in detail. The bead types in Lund share standard features of other Scandinavian beads and are, as mentioned, quite frequent in 11th-century contexts. During the 12th century, the use of beads decreased, and by the end of the century, the use seemed to expire. In contrast, the practice of using beads in Sigtuna seems to be constant throughout the 13th century. This indicates a difference in practice patterns in relation to the use of beads, and it has been argued that the townspeople in Sigtuna held on to a Viking Age ideal and expression longer than the townspeople in Lund. The rather radical decrease of beads in 12th century Lund has been interpreted as a swift change towards a continental cultural influence (Salminen 1996: 53ff.; 1998: 66; Carelli 2001: 171f.). In Nyköping, practice patterns in relation to beads decrease from the first few decades of the 13th century (Bäck 2016: 141f.; Nordström in prep), expressing a pattern somewhere between Sigtuna and Lund.

Glass rings

Another exclusive category of personal items is small pieces of glass rings, presented in Table 2.

Glass rings are rare but have been found in Scandinavian towns such as Sigtuna, Lund, Lödöse, and Uppsala. The glass rings in Nyköping appeared during the first half of the 12th century to the second half of the 13th century. Notably, three rings were found in plot number five (table 2). The glass rings were either made of lead glass or wood-ash glass. The lead glass rings were carefully made and appear more exclusive than the rather humble-looking wood-ash glass rings. During the period 900–1200 CE, lead glass rings are particularly common in eastern Europe, like Poland, Ukraine, Novgorod, north Germany and southern Scandinavia, but they also appear in England (Haggrén 2017a: 41). The wood-ash glass rings are smaller and more straightforward than lead glass rings and are suggested to have been worn predominantly by children. Wood-ash glass rings have been produced in northwest Germa-

Fig. 4. A box brooche (F4820) and a fish-headed pendant (F4314) found on plot five, both contextually dated to c. 1200-1230 CE. Photo: Henrik Phil, National Historical Museums.
Dosformigt spänne (F4820) och ett fiskhuvudformat hänge (F4314) funna på tomt fem, båda kontextuellt daterade till ca. 1200-1230 e.Kr.

No	Material	Colour	Plot	Contextual dating
1009	Lead glass	Green with yellow drops	3	1200-1230
1252	Lead glass	Green	5	1200-1230
2893	Lead glass	Green	5	1160-1200
1855	Wood-ash glass	Beige	6	1260-1290
7871	Wood-ash glass	Beige	4	1125-1140
7872	Wood-ash glass	Beige	5	1140-1160

Tab 2. Compilation of glass rings in Nyköping. After Haggrén 2017a.
Sammanställning av glasringar i Nyköping

ny, primarily for a West Slavonic market (Haggrén 2017a: 42). Haggrén (2017a: 44) argues that glass rings, above all the wood-ash rings, should be seen as a Slavonic ethnic marker and that the rings underline the cultural contacts and networks of the locals in Nyköping.

Box brooches

Besides contacts with the Slavonic market, there are strong indications that the inhabitants of early medieval Nyköping also had ties to Gotland. This is demonstrated by a set of female Gotlandic dress accessories consisting of two box brooches and a fish-shaped pendant found in plot no 5 (fig. 2 & 4), which all were discarded during the first decades of the 13th century (Bäck 2016, Nordström in prep.).

Box brooches and fish-headed pendants are mainly indigenous to Gotland, and only a few have been found outside the island. Traditionally, such brooches and the pendants have been linked with the female gender, often described as an ethnic marker of Gotlandic females. More than 850 box brooches are found on the island, mainly in pre-Christian burials and Christian churchyards, in hoards, and as loose finds (Thunmark-Nylén 2006: 24; Gustafsson 2013). Twenty-nine brooches (including the two from Nyköping) are found outside of Gotland. Box brooches have been found on the Swedish mainland, on Öland and Åland, and in Denmark, as well as in Latvia and Lithuania. Ten of the twenty-nine brooches have been retrieved from burials; the rest have been found in trading places and early medieval urban centres, such as Hedeby, Birka, and Lund (Thedeén 2012: 65ff.).

The two box brooches from Åkroken are of type P7 or P8 with dot ornamentation. The types belong to the simpler and latest forms of brooches and are likely to have been manufactured during the second half of the 11th century (Thunmark Nylén 1983: 94, 100). If the manufacture date is correct, the box brooches had been in use for more than 100 years when they finally were discarded. As mentioned, the set of dress accessories was found in the same household during the same period (c. 1200–1230), indicating that they belonged to the same household. Drawing on Roberta Gilchrist's profound research on medieval engendering processes, one can suggest that a similar set of jewellery can be interpreted as heirlooms, precious objects passed on from mother to daughter within a family. Gilchrist suggests that archaeological candidates for heirlooms are found in unusual contexts – often humble domestic or personal objects that contrast mass-produced typological artefacts (Gilchrist 2012: 237ff.). Objects curated into heirlooms are often gifts connected to life course rituals, like baptisms and marriage. Several factors influenced the choice of heirlooms; for instance, the object's biography may have been inherently bound to a venerated person or place of origin (Gilchrist 2013: 5). Objects with ethnic and intergenerational connotations – like the Gotlandic box brooches from Åkroken – combine several of these qualities.

As mentioned, box brooches and fish-headed pendants have traditionally been viewed as ethnic markers of Gotlandic women. Recent studies have shown that ethnicity need not be bound to a fixed area. Instead, we need to consider what happens when objects and individuals carrying the objects shift places and encounter others (e.g. Callmer et al. 2017; Roslund 2022) when humans/objects intra-acts in new social settings.

Two-thirds of the box brooches outside of Gotland have been found in trading places and early medieval towns, where we expect to find objects/humans of various origins intra-acting. Some objects show signs of alterations, such as changing the original use of the brooch, which can be interpreted as the object's biography expanded with its *life course* and use in new social environments. For instance, one brooch found in Hedeby, Denmark, had been filled with lead and repurposed as weight (Thunmark Nylén 2006: 29). The box brooch burials outside of Gotland also seem to consist of atypical combinations of objects compared to traditional sets of Gotlandic arrangements, mixing objects with different origins and female dress associations. While the female connotation seems to remain for the box brooches (all of them were found in female-gendered burials. See Thedeéen 2012: 68ff.), Thedéen argues that the ethnic marker of the non-Gotlandic objects had merged into a new type of creolised and cosmopolitan identity (Thedéen 2012: 78 with refs.). In short, following Barad's agential realism, the object/owner's new social contexts and their intra-action seem to add new elements to the object/owner's biographies, resulting in new forms of engendering identity processes.

Discussion

All three object categories analysed above indicate that (some) women in the 12th century Nyköping households shared an identity rooted in a late Scandinavian Viking Age cultural expression with eastern connotations. The analysis shows that the household in plot number five stands out since a predominant share of the discussed objects was found here. The box brooches found in other places outside of Gotland have been interpreted as representing a creolised cosmopolitan identity, which, in this case, might be a plausible interpretation. The early medieval town was a meeting place and melting pot where various people, goods and ideas intra-acted, a heterogeneous environment where networks, alliances and cultural traditions were created and negotiated (e.g. Roslund 2018: 38). Following Thedéen, I argue that the 12th-century females residing in Åkroken wearing these objects expressed a cosmopolitan identity.

Most of these objects were discarded during the first decades of the 13th century. This coincides with a potential demographic increase in Nyköping during the latter decades of the 12th century, as evidenced by plot divisions and spatial changes within the plots (Nordström & Lindeblad 2016: 179ff.). Analysis of the ceramic profile also shows a significant shift in consumption during the period 1160-1200, with a wider variety of imported goods, primarily from southern Scandinavia and western Europe (Bäck & Roslund 2017: 63). In the initial decades of the 13th century, sporadic pieces of glass vessels appear in households, highlighting interregional contacts with northern Germany (Haggrén 2017b). Throughout the 13th century, several institutions, often cited as urbanisation indicators, such as a Franciscan convent, multiple churches, and a town square, emerged in Nyköping. This suggests that the decades around 1200 marked a significant transformation in the town, leading the townspeople to intra-act with other materials and cultural traditions. Given this context, the discarded heirlooms in plot five, reminiscent of a now outdated expression of identity, should reflect the townspeople's transition to a new lifestyle and other collective identities. The general practice pattern of the glass beads underlines the transition.

The Linnean household in 18th-century Uppsala

The second case study is taken from a different environment. In the autumn of 2022, we had the opportunity to excavate part of Carl Linnaeus' (1707-1778) home, Prefektgården, in Uppsala. The excavation did not cover the living house or the famous Botanical Garden adjacent to the home. However, part of the household was excavated, including a free-standing outbuilding, part of the stables and a courtyard (fig. 5). In contrast to the household situation in medieval Nyköping, there is a great variety of archival sources and previous research regarding Linnaeus, especially as a scientist, but also about his persona and family (Windahl Pontén 2020: 27f.).

Historical background and household members

The Linnean Garden in Uppsala is internationally renowned and Sweden's oldest Botanical Garden. It was founded in 1655 by the genius Swedish natural scientist Olof Rudbeck the Elder (1630-1702). Carl Linnaeus arrived in Uppsala in 1728. He soon won the endorsement of the professor of medicine at Uppsala Academy, Olof Rudbeck the Younger (1660-1740). Linnaeus moved in with the Rudbeck family, who then resided at *Prefektgården*, working as a tutor to the Rudbeck children. In short, Linnaeus became responsible for demonstrating the botanical garden to medical and botanical students and visiting international scholars. During this period, he laid the foundation for the ground-breaking new binomial classification system for plants and animals, manifested in his Major Opus *Systema Naturae*, first published in 1735 (Hamberg 2018: 47ff). In 1741, Linnaeus was appointed professor of medicine and botany at the Uppsala Academy. Subsequently, he and his family moved to the newly renovated *Prefektgården,* adjacent to the likewise renovated botanical garden. In 1758, Linnaeus was knighted by the king and in the same year, he bought a farm, Hammarby, just south of Uppsala, where he continued to expand his garden and botanical research (Windahl Pontén 2020: 36).

Linnaeus and his wife had five surviving children, yet from the archival records, it appears that the household, at the most, was composed of 12 individuals, including servants. The number of servants varied between one to five per year.

Fig. 5. The reconstructed Linnaeus Garden (to the left) and private home of the Linnean family in Uppsala (upper right corner). The excavation concerned an outbuilding (lower left corner), part of the stables and a courtyard (not visible in the picture). Photo: Annika Nordström, National Historical Museums.
Den rekonstruerade Linnéträdgården (till vänster) och familjen Linnés privata hem i Uppsala (övre högra hörnet). Utgrävningen gällde ett uthus (nedre vänstra hörnet), del av stallet och en innergård (syns ej på bilden).

Typically, there were two female and one male servant. At various times, the household also included students, professors, and prominent visiting scholars who came to learn from the famous natural scientist. It is fair to say that this large household and the botanical garden were essential for the ground-breaking scientific work conducted by Linnaeus, as they intra-acted in forming and performing his persona (Windahl Pontén: 51f, 108-120).

The archaeological excavation

As mentioned, the excavation encompassed the outbuilding, part of the courtyard, and part of the stables. The outbuilding was constructed of a stone foundation, probably with timber walls, and two storeys high. The house was divided into two rooms, separated by a passage, and both rooms had foundations for fireplaces (fig. 5). The house has been interpreted as living and working quarters for people employed in the Linnean household. An overview of the find assemblage implies a wealthy burgher household with the difference that a large part of the ceramic profile consisted of planting pots and urns. The variety of flowerpots contributes to our knowledge of the management of the Botanical Garden and issues regarding everyday life and socioeconomic status of the Linnean household (Nordström in prep). In the following, I will discuss three types of flowerpots - planting pots, urns, and tulip vases – and how they relate to issues concerning status and identity.

Fig. 6. Two urns found in the excavation. To the left, a large urn with a Medusa head. To the right, an urn decorated with a lion's head. Photo: Karin Lindeblad, National Historical Museum.
Två urnor funna i utgrävningen. Till vänster en stor urna med Medusahuvud. Till höger en urna dekorerad med ett lejonhuvud.

Flowerpots from the Linnean household

In Sweden, very little research has been done on flowerpots. This might be explained by the fact that pots used to nurture plants over time have had a similar design, making it challenging to differentiate the planting pots in time and space. The planting pots are hand-turned, made of unglazed earthenware, and typically have a hole in the bottom. In some cases, there can be several holes in the bottom and sides of the pot. In Sweden, planting pots began to be manufactured by Swedish potters no later than the 17th century. Gardeners initially used them in the large formal gardens of castles and manors (Lindqvist 1981). Excavations in Swedish towns have shown an increased use of planting pots by Swedish burghers in their kitchen gardens during the 18th and 19th centuries (e.g. Hedvall 2017).

Currie (1993) has investigated the unglazed planting pots of England and Wales by examining both written sources and archaeological records. He concludes that planting pots changed subtly over time. Regional characteristics and datable features can be identified, which contest the commonly held view that pots were made to a standard design throughout the early modern period. Currie also found that although pots were used to contain plants throughout history, it was not until c. 1700 that purpose-made flowerpots were manufactured in any quantity (Currie 1993: 240). Research on planting pots is still in its infancy in Sweden, and more analyses are needed to increase our knowledge of the development of the uses of this form of ceramics.

The planting pots found in the Linnean household display a wide variety of sizes, frequency and placement of holes. The diversity indicates that the pots were designed to cultivate various species with specific needs, showcasing the growing knowledge about plants in the 1700s, thus requiring a greater diversity of pots.

Some large urns, probably used for illustrious flower arrangements and exotic plants craving winter storage indoors, either at home or in the orangery, were found within the excavated household. Most of the urns were made of red earthenware, often with traces of glaze. Several urns were decorated with animal, floral, and wave band decorations (fig. 6). Urns of this size are unusual finds in the typical bourgeois households in Swedish early modern towns. Iron urns were a relatively common feature in Swedish historic manor gardens from the mid-17th century onwards (Flink 2004). Those urns were expensive but probably more durable than ceramic urns and have survived longer in historic gardens. The relatively large quantity of ceramic urns found in the Linnean household is noteworthy and may suggest that forming illustrious floral arrangements was part

Fig. 7. The sherd of a yellow tulip vase found during the excavation (left) and the exhibited tulip vase in the Linnean Museum in Hammarby, to the (right). Photo left: The Archaeologists, National Historical Museums. Photo to the right: Uppsala University.
Skärva av en gul tulpanvas funnen vid utgrävningen (till vänster) och den utställda tulpanvasen i Linnémuseet i Hammarby, till höger.

of the everyday practice. The urns were found in the destruction layers of the outbuilding, indicating that the practice was performed by servants. As in the case of planting pots, this type of ceramic urn is poorly researched in Sweden, and more analyses are needed to further the knowledge of their uses and development.

Another type of flowerpot found was a piece of a yellow tulip vase (fig. 7). A similar vase is exhibited in the museum at the Linnaeus farmhouse in Hammarby. The vases are imported from Holland. During the 17th and 18th centuries, tulips and other flowers were popular motifs in visual arts and on various items, symbolising knowledge, happiness, and prosperity. Swedish society during the 18th century was influenced by practical rationality, public utility and progress, and a specific aesthetic and the notion of universal beauty. The vases' materiality encompasses several of these traits and intra-acts with the individual as well as the collective identity and may be interpreted as an expression of an international, cultural and knowledgeable household.

Discussion

As mentioned, the material assemblage found in the Linnaean household, including ceramics, glass vessels, and a few personal items, share traits with what we usually see in wealthy bourgeois households in 18th-century Swedish towns. However, the abundance of various flowerpots stands out, which may not be surprising given Linnaeus's fame and contribution to the natural sciences. The context in which the pots were found implies they were part of the household's everyday life and can be interpreted as part of the daily routine of performed actions by different household members.

The science historian Annika Windahl Pontén (2020) studied identity and materiality in Linnaeus' household. She uses archival records and his own scientific and personal writings, as well as artefacts such as preserved clothes and furniture and the architecture of the living house, to describe and analyse how his persona formed through the performative practices of the household. She found that the consumption and practices in the Linnaeus household reflected what was common among social groups of similar status in 18th-century Sweden. However, some features, such as specific clothing and furniture, as well as designated spaces for hosting scientific *and* social functions, are characteristic of academic households in Uppsala more specifically (Windahl Pontén 2020: 89f., 203ff.). Windahl Pontén argues that these features formed part of a new persona, and she labels *the academic gentry*. She convincingly demonstrates how this persona represents a transition from an

older aristocratic system towards a new meritocratic system (Windahl Pontén 2020: 198-201). Linnaeus was raised to nobility through his scientific work and his work for the Swedish state, but the persona of the academic gentry was shaped by Linnaeus and his family and other household members (servants and students).

The flowerpots found in the Linnean household underline this in several ways. The various planting pots indicate that the nurturing of plants (for the botanical garden and educational purposes) occurred within the Linnean household and imply that the nurturing was part of daily life. This shows that the household functioned as part of the infrastructure for scientific work and education. The decorative urns and the tulip vases show that floral arrangements were part of everyday practices and can be interpreted as expressions of cultural as well as knowledgeable ideals. The contextual analysis of the flowerpots shows that the relational processes between their materiality and the practices of members in the Linnean household intra-acts in forming the persona of an academic gentry – Carl Linnaeus is becoming a famous and successful scientist through these processes.

Conclusion

The two cases presented in this paper are very different. The aim was to contribute to the knowledge-making process of intersectional identities in urban households by using the concept of intra-action and object biography. In the first case, gendered dress accessories are used to analyse how material objects turn constitutive active agents in the construction of ethnicity through intra-action of material, meaning, social patterns, and, not least, context. The analysis also provides insight into cultural transitions to new lifestyles and material practices. In the second case, different types of flowerpots are analysed as active agents in the process of shaping a desired persona, an academic gentry. The analysis shows that even though this persona is connected to one person, the famous scientist, several household members probably participated in the process. The experiences and contributions of somewhat marginalised individuals (women and servants) are highlighted in both case studies.

I argue that qualitative micro-scale analysis, post-humanist relational approaches and object biography towards materiality enhance our understanding of collective and individual identities and the material practices of everyday life. Understanding social identity categories through the lens of material culture as active agents intra-acting with their surroundings allows us to interpret material practices in urban households with greater sensitivity, leading to richer reconstructions of the urban way of life.

Summary

In our pursuit of humanising urban space, increasing efforts within urban archaeological research concentrate on analysing the social aspects of urban life. The enduring interest in objects and materiality and treating material culture as active and meaningful has stimulated the growth of social archaeology. In the paper, aspects of intersectional identities in urban households are analysed in relation to material culture and material practices. The objective is to demonstrate how relational post-humanist approaches, in combination with object biography, can enhance our understanding of the interconnectedness of material culture and the individuals in forming and changing intersecting identities such as gender, ethnicity and socioeconomic status. The argument is explored through two case studies on the archaeological record from two very different urban households. The first case study deals with issues concerning female-gendered dress accessories analysed in relation to the construction of ethnicity. In the second case study, different types of flowerpots are analysed as active agents in the process of shaping a persona, an academic gentry. The analysis demonstrates that understanding social identity categories through the intra-actions of material culture and its surroundings enables a more nuanced interpretation of material and social practices in urban households, leading to enriched reconstructions to urban life.

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Urban Early Modern Houses: From Excavations to Standing Structures, and Back Again

By Göran Tagesson

Early modern urban archaeology has seen considerable progress over the last thirty-forty years, which has resulted in a substantial body of documentation. On the other hand, research and deeper studies of the results have been more limited.

Over the past few years when working with the research project *HASP – Houses and Social Practice 1600-1850,* our object has been a methodological and terminological integration between the archaeology of remains below ground, analysis of standing buildings and the history of inhabitants and owners.

The idea for the project arose during the large-scale urban archaeological excavations in Kalmar that were carried out in 2008–2012, resulting in considerable progress in the cooperation and integration of the work among archaeologists, historians and researchers specialised on crafts. Our research questions revolve around the design and function of dwelling houses and varieties of cohabitation, and how this changed during the course of the studied period (Lindström & Tagesson 2023). This cooperation has led to a deeper understanding of buildings as complex phenomena, as processes, and as places for living people, but also as a place for knowledgeable interaction between different disciplines. To assist us in this interaction we have developed a set of simple but efficient theoretical concepts and methods. Perhaps this can be expressed as follows: fifteen years ago, we the excavating archaeologists, took a step out of the trench and into three-dimensional standing houses of a similar date in order to reach a better understanding and knowledge of these buildings. From this perspective, we need to reflect on our methods and understanding of housing and dwelling. In a tangible way, we have now combined the study of buildings above ground and below ground into a buildings-archaeological practice. We now work methodically as historical archaeologists, integrating archaeological and written sources. The question is, how do such insights and this new understanding affect archaeological excavation?

The purpose of this article is to discuss archaeological documentation of buildings. How do we excavate and understand buildings? In the documentation, how does the archaeological concept of building remains relate to the broader concept of *house*? How can we attain deeper knowledge by adding a historical perspective of buildings archaeology in future archaeological excavations? Which knowledge can we bring back to the trench?

Background

Early modern buildings archaeology has a background in the development and professionalisation of urban archaeology during the 1960s and 70s onwards. This has been accounted for in other contexts (Thomasson 2011; Larsson 2017). Extremely simplified, it can be said that earlier generations of archaeologists were mainly concerned with the remains of a limited range of buildings, usually stone houses or aristocratic buildings. Later the scope broadened as a result of professional contract archaeology from the 1970s and onwards. Focus on early modern remains intensified in the 1980s, and buildings archaeology has been further influenced by later technical and methodological developments.

Within the HASP-project, we have analysed and problematised archaeological excavations from five Swedish towns: Linköping, Kalmar, Vadstena, Norrköping and Jönköping (fig. 1). These towns are included in the HASP-project in various ways, complementing each other; some having a rich archaeological source material (Jönköping, Norrköping, and Kalmar), others having excellent conditions of preservation for standing buildings (Linköping, Kalmar, and Vadstena). After a close reading of all relevant archaeological reports from these towns, an interesting picture of the development of urban archaeology during the studied period emerges, especially up to 1800. Further, it can be seen that changes in methodology and in heritage management have been carried out at different points in time in different local contexts. Roughly, we can see three stages of change reflected in the documentation of buildings, how chronologies were built, and the significance of this in the interpretation and understanding of individual buildings (Tagesson 2019; Tagesson 2020: rapport 6).

When studying the documentation of individual early modern buildings, a striking point is that most of the traces could be considered simple and uncomplicated, without distinctive characteristics. This obvious lack of conspicuous details could explain the absence of deeper analyses. The illusive plainness of the houses may often have

Fig. 1. Map of Sweden with the five towns discussed in this article. Map Franciska Sieurin-Lönnqvist
Karta över Sverige med de fem städer som diskuteras i denna artikel.

led to assumptions that observed variations were coincidental and that morphological features occurred randomly; recorded variations may therefore have been perceived as uninteresting or not possible to study. When examining the buildings in our study, it has become clear that most of the traditionally applied analytical methods are insufficient for attaining a deeper understanding of the history of the buildings. The reasons for this are manifold (Lindström & Tagesson 2023; Lindström & Tagesson 2025, with quoted references).

Firstly, we are still stuck in a research tradition focusing on architectural styles and types of houses, and this has entrenched a functionalist and formalist interpretation of buildings. In Sweden, ethnological research tradition has been predominant, mainly centred on rural building traditions and applying typological classification based on functional and constructional characteristics (Erixon 1947). However, there are later examples where this perspective has been avoided, and the researchers have endeavoured not to analyse the buildings according to conventional typologies of buildings (Öbrink & Rosén 2017: 81). It can be a useful strategy to endorse a more open-minded archaeological documentation. Nonetheless, if the method is not accompanied by a corresponding strategy for spatial analysis of the recorded building remains, the risk is that we cannot identify differences or similarities, and this would instead strengthen the idea of these houses as plain, uniform and uncomplicated.

Secondly, buildings are often studied one-dimensionally, disregarding the fact that houses often represent space and time. Presentations often tend to focus on one specific aspect or historical phase, usually the construction phase, which underestimates change, rebuilding and long periods of use. When buildings are only seen as static and ideal types this means that the housing culture appears to represent stability and inertia, as when the life course of a building is divided into specific, limited and frozen moments. The buildings are turned into snapshots.

Thirdly, the human aspects of buildings are often overlooked. The presence of flesh and blood is lost among bricks, mortar and timber, as well as the agency of individuals and groups. Popular stories usually focus on certain individuals or spectacular events that have occurred in particular houses. Diversity, dynamics and changes are ignored. Moreover, this perspective tends to enhance simplified gender stereotypes, diminishing or concealing female owners, female practitioners and female agency (Eriksdotter & Anglert 2018: 37ff). Instead, we want to understand the buildings as places for life and living, dwelling and work, but also as material entities inhabited by people with an agency of their own (Eriksdotter 2005: Johnson 2010; Eriksdotter & Anglert 2018: 49–53; Lindström & Tagesson 2025).

Fourthly, scientific research, education, and restoration methods involve separate methods and professions. We are archaeologists, architectural historians or building conservation officers. Furthermore, there is a group of professional carpenters and craft researchers with profound insights into historical techniques and construc-

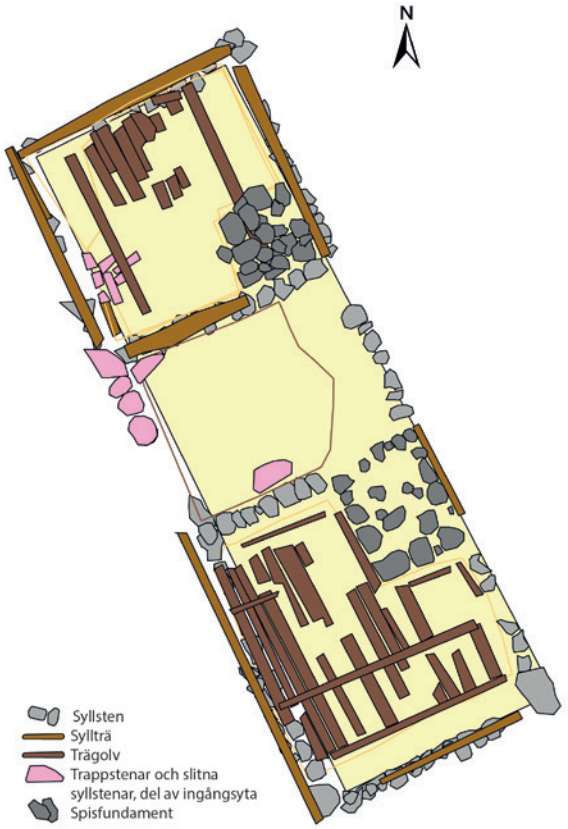


Fig. 2a–c. A house from 17th century below ground, documentation and a house just before demolition from the Gesällen block, Kalmar. Photo Arkeologerna and archive of Kalmar läns museum.
Ett hus från 1600-talet under jord, dokumentation och ett hus strax före rivning från kvarteret Gesällen, Kalmar

tion methods. Each profession is necessary, but there is also an obvious risk of division, which is a challenge in the integration of our different work methods and results (Eriksdotter & Anglert 2018: 19ff; 49ff).

Theory and concepts

In the current project *HASP – Houses and Social Practice 1600–1850,* the aim is to integrate the study of building remains below ground, standing buildings and historical sources to bridge the differences between the above-mentioned different perspectives. Our goal is to study buildings not only as physical structures but also as integrated in social practice: houses as homes and places filled with life and living (Eriksdotter & Anglert 2018: 19ff; 49ff) (fig. 2).

To understand the temporality of individual buildings we apply *Single Context Recording*, inspired by archaeological methodology. This method helps illuminate variations between short periods of construction work, extended periods of use, short intervals of renovation and rebuilding, further periods of use and finally the demolition of a building. The method provides an incentive to actively search for various traces of use and change, in order to discover and identify major and mi-

nor events that divided the total life course of the building into intervals.

The concept of *morphology* represents a way of analysing the physical and spatial structure, the number of rooms, their placing in relation to each other, and fireplaces. Morphology is a useful concept that integrates design, construction and processes. Contrary to the concept of type, morphology highlights variation, and opens up for more flexible analyses.

Access analysis of buildings is another aspect of morphology, and can be studied by identifying thresholds, doors and passages (Hillier & Hanson 1984). Access is often easier to study in standing buildings but is an important point to observe in archaeological contexts below ground. It can be traced through the presence of stepping stones, compacted surfaces and thresholds. Such aspects are vital for analysing access to different parts of the building, as well as changes in access over time.

Timber analysis is a method mainly used for standing buildings but should also be possible to use at archaeological excavations. The study of craft techniques and working together with craft researchers offer archaeologists a better understanding of the materiality and technical aspects of buildings, but also construction methods and living in the houses as social practices. Timber analysis is, moreover, a precondition for dendrochronological sampling and dating of the houses and their various phases.

In addition, physical buildings can be studied in relation to *household reconstructions* through documentation and analysis of the inhabitants and owners. With the help of written sources, it is possible to reconstruct which individuals and households that lived and worked in the houses from the middle of the 18th century and onwards. By combining the study of houses as material processes with the social aspects of living, a comprehensive picture is achieved, which we term *biography* (Lindström & Tagesson 2023 and quoted literature; Lindström & Tagesson 2025).

The concept of *household archaeology* was introduced in the beginning of the 1980s with the purpose of deconstructing overarching narratives of archaeology which emphasise large-scale structures and societal processes. Households were defined as the smallest social unit of society, which rendered more attention to everyday life and living conditions (Wilk & Rathz 1982; Allison 1999; Barile & Brandon 2004). Usually, households are understood as social and economic units of cohabitating people, although with limited potential for closer studies of the composition of households in earlier periods. Often the word household tends to be used as a comprehensive concept implying the study of everyday life, living conditions and work of ordinary people in more general terms. Lately, the term household has been introduced as a stratigraphic concept within single context archaeological methodology as a way of visualising a group of people who live their lives during a particular period in a specific place (Gardelin & Johansson Hervén 2001; Gardelin & Balic 2016; Kjellberg 2021: 41ff).

Household archaeology as a concept is interesting but can cause a certain amount of confusion. When we use the term *household* in the HASP project, we mean a historical and analytical concept encompassing both structure and function in the sense that the household was recognised by the authorities and by the historical individuals themselves as a unit of people who shared a place of abode, work, and livelihood. Furthermore, this can be studied in both written and archaeological sources from the middle of the 18th century and onwards (Lindström 2020; Lindström & Tagesson 2023; Lindström & Tagesson 2025). The more clear-cut archaeologically defined concepts of household archaeology, household as everyday life or household as a stratigraphic concept, on the other hand, are based on a number of assumptions about how people lived and ways of life when the actual physical and social structures of living are largely unknown. An explicit purpose of the HASP project is instead to analyse and discuss the concept of historical households in relation to archaeological investigations of materiality and spatiality of houses dating from periods with available historical source material. Knowledge and insights from these contexts may then possibly be applied in situations when the source material is less well preserved (for a similar application, see Rosén & Larsson 2017).

Our study is further highly influenced by *micro-historical* and *micro-geographical methodology*, with an awareness and ambition to study large-scale societal change as if through a microscope lens. In micro-history, there is a recognition that history is composed of a myriad of minor local histories, which can be studied to illuminate

the major narratives of history (Levi 1991; Magnusson & Szijártó 2013). There is an interesting connection here to archaeological practice, which could be said to be micro-historical by nature. Within Swedish archaeology, *micro-archaeology* as a concept comparable to micro-history has been introduced (Cornell & Fahlander 2002). However, in English-speaking contexts, *micro-archaeology* is "*the study of microscopic archaeological record, that is, everything that cannot be seen by the naked eye and therefore requires the use of instrumentation*" (Weiner 2010).

Further, we consider the concepts of *agency* and *practice* as crucial in the study of houses, particularly with reference to our ambition of understanding the interplay between materiality and lived lives (Shove, Pantzar & Watson 2012; Christophersen 2015). We have identified the necessity of applying an explicit *gender perspective*, which has been an important concept for generations of historical studies. Awareness and application of this have been more restricted in historical archaeology, most likely due to challenges involved in finding and problematizing individuals or groups of people in the archaeological source material. Integrating history and archaeology in studies, therefore, offers the opportunity to identify and discuss these challenges (Gilchrist 1999; Spencer-Wood 2004; Schmidt Sabo 2005; Tagesson 2020 with quoted references).

In a previous study, the author has illustrated the structural gender inequality that is inherent and concealed in the archaeological stratigraphy. In the early modern period, there are clear indications that men were more extensively involved in construction work and in building new houses, while women influenced and participated in phases of use to a much greater degree. We have mentioned above that the traces of use and maintenance are less distinct in the stratigraphic sequence, while periods of construction are more manifest and thereby receive attention to a larger extent. Consequently, a gender perspective that evidently misinterprets and conceals women's agency is inherent in the stratigraphic sequence and in traditional methodology. This recognition, therefore, necessitates new methods and excavation strategies (Tagesson 2014; 2020).

Documentation – methods and technology

Our examination of archaeological excavations, which include remains of buildings from the early modern period in five towns, covers the years 1982 to 2015 (fig. 3). A distinct line of progress can be followed from earlier stratigraphical excavations in the 1980s to a gradual inclusion of single context method and digital recording in the 1990s and 2000s (Tagesson in prep, rapport 6).

Town	Vadstena	Kalmar	Jönköping	Norrköping	Linköping	Total
1980–1984			2			2
1985–1989			1		1	2
1990–1994						
1995–1999	1		1	4		6
2000–2004	1		1	1		3
2005–2010		1	4	3	1	9
2010–2014		1		3		4
2015–2019						
Total	**2**	**2**	**9**	**11**	**2**	**26**

Fig. 3. Archaeological excavations that include remains of buildings dating from the early modern period in the five studied towns.
Arkeologiska utgrävningar som inkluderar rester av byggnader från tidigmodern tid i de fem studerade städerna.

The differences between these methods, as well as their substance and their consequences, have been detailed in other studies (Larsson 2000; 2017; Tagesson 2019; Kjellberg 2021: 71–77). Suffice to say here is that it is evident when reading the reports that the choice of method affects the documentation, both when it comes to illustrations and descriptions in words. Documentation of individual building remains has steadily improved during the studied period. Nevertheless, single context recording generates huge amounts of data that need to be systematised but also made intelligible and accessible. Archaeology is thus facing immense challenges, which must be discussed and developed.

One vital matter is a vocabulary of concepts. The significance of a strict documentation strategy cannot be emphasised enough. It is crucial that the archaeologist clearly accounts for how the single context method has been applied, including which concepts have been used and how. The core concept of the single context method is a *single context*, meaning the smallest stratigraphic unit that can be identified in terms of time and function (for example, a cobbled surface). It is sometimes defined as a single event. Since the 1990s, such depositions and constructions have often been defined as primary, secondary and tertiary contexts. Frequently, this is extended to encompass various types of constructions, cultural layers and cuts; the concepts can also include a culture-historical interpretation of the origin and function of the context (for example, primary activity layer, secondary layer of waste, tertiary levelling of surface) (Harris 1989; Larsson 2000; Tagesson 2003; Larsson 2017). A general and universal terminology would have been useful but is hardly possible to achieve. Therefore, it is important to define the terminology *for each archaeological excavation*, in order to create a common vocabulary and frame of reference within the work group, as well as for the reader of the report.

Apart from context, the term *group* is significant, representing a number of separate contexts that can be assimilated into a common function (for example, the different contexts of a house). The total life-cycle of an individual building thus consists of many contexts and groups, for example, in relation to the groundwork and construction of the building, the use of the building, renovation, further periods of use and finally demolition. The main difference compared with earlier methodology is that a structure (a house) was in earlier days described as encompassing construction, use and demolition. It is of considerable significance if the documentation instead defines and analyses events throughout a continuous course of time, which provides the archaeologist with an efficient tool to understand and interpret the total life of the building, termed *life course*.

Lately, the concept of *phase* has been criticised – and rightly so. In earlier archaeological methodology, buildings and traces of human life were forced into square boxes, which could encompass several plots, parts of a town or entire towns in the same chronological segment (Gardelin & Johansson Hervén 2001; Fogelberg, Gardelin & Menander 2004). This can be clearly seen when reading reports from the 1980s. The point of single context method is to define and date individual courses of events on each plot and in each house; although it is of less importance, in my opinion, how we term these segments of time, as long as we clearly explain and define what we mean. In later years, we have seen many different attempts to introduce new concepts. Nonetheless, the concepts of context, group and phase are sufficient and helpful. They are simple concepts that need to be defined but can capture the succession of time and events.

An interesting part of the archaeological work is that the source material is produced actively in the field through deconstruction of the stratigraphy, by recording it and making reconstructions. Participant observation is thus an important part of the archaeological work, a factor near the kind of empirical archaeology that, in turn, generates physical experiences. Often, there is talk of *the smell of Middle Ages* or *a sense of the 17th century* amongst archaeologists. This skill, a form of tacit knowledge, takes time to build up but is almost impossible to put in words and reproduce in the documentation.

One example is the tactile identification of trampled surfaces, such as hard surfaces that were left open without specifically having been covered with stones or gravel. This is a vital understanding for being able to identify entrances to houses or between rooms, and therefore also important for studying ways of access within houses and for analysing morphology. These skills correspond to the proficiency of crafts historians in un-

derstanding traces of crafts, and their knowledge of historical crafts.

The art of recording is another challenge. It is essential to distinguish between method and technology, in the sense of the intellectual work of creating a way of working in order to deconstruct, record and reconstruct. Considerable technical advances have taken place throughout the studied period. It is interesting to see that the development of single context recording has kept pace with the progress of digital documentation technology. However, sometimes a mix-up between method and technology occurs in descriptions of archaeologists' work. To my mind, there is sometimes too much focus on technology at the cost of methodology. Method cannot be replaced by technology. Rather, methods and research questions should be the foundation on which technological development rests (Eriksdotter & Anglert 2018: 68–74).

These questions often lead to the challenge of visualising the archaeological record. Despite thirty years of hard work, I am not impressed with the results. An attempt to study the digital documentation from archaeological work is frequently an ordeal even for an experienced archaeologist. I can willingly offer my own digital recording as examples of serious failure, with technical solutions that can hardly be understood by anyone other than those who were involved. Of course, when the archaeological source material gradually becomes more detailed, often spoken of as *high-definition archaeology*, the challenge is to carry out the recording in a way that generates manageable data which can be presented in an intelligible manner (see fig. 4 for an illustrative comparison).

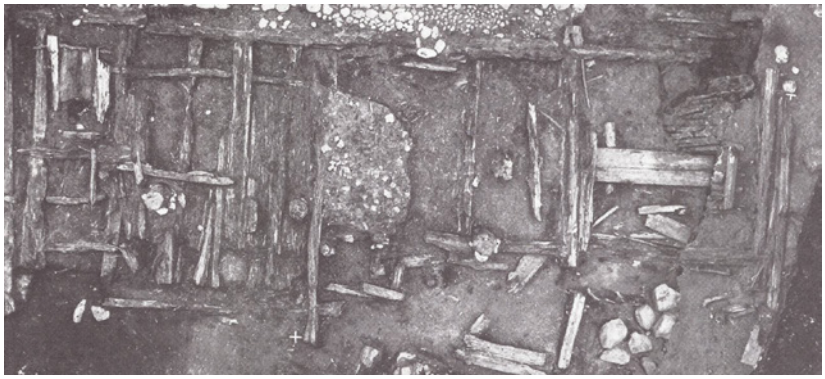
Working with standing buildings together with craft researchers provides a partly different perspective. Measuring roof trusses or timber joints can still be difficult despite the help of photo scanning, laser scanning and modern 3D technology. The craft researcher or building conservation officer usually solves the problem by measuring by hand instead and presenting the general outline, main observations and technical solutions in graphic form. Several craft researchers particularly mention the ability to see and draw as an integrated form of analysis. The drawing of observations is part of the process of interpretation (Sjömar 1988; Sjömar, Hansen, Ponnert & Storsletten 2000; Eriksdotter 2005: 118ff). This type of analytical documentation would suit the methodology of field archaeology excellently, but there is a lack of both knowledge and inclination to experiment. There is, among us, a profound scepticism and inability towards this kind of documentation.

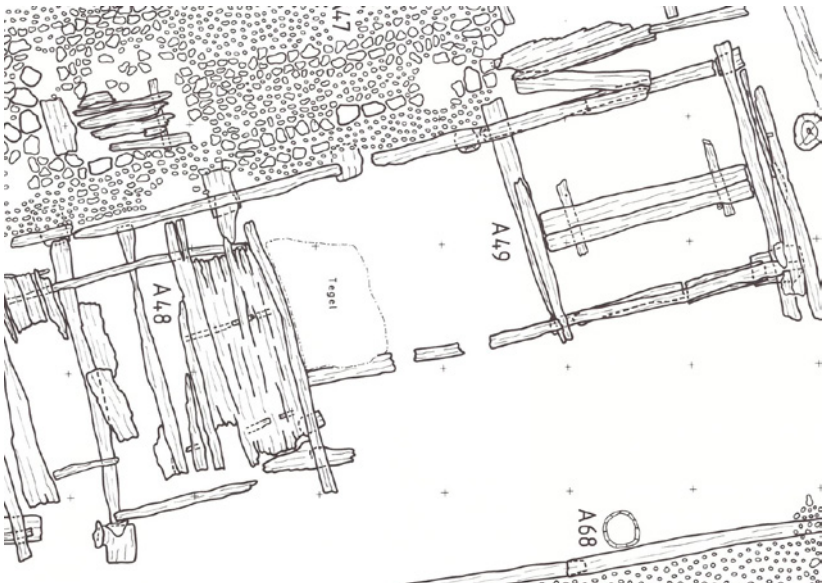
Instead, we try to bypass the problem by applying ever more refined technology. The question is whether this is the right way to go if we want to make the documentation more objective and intelligible.

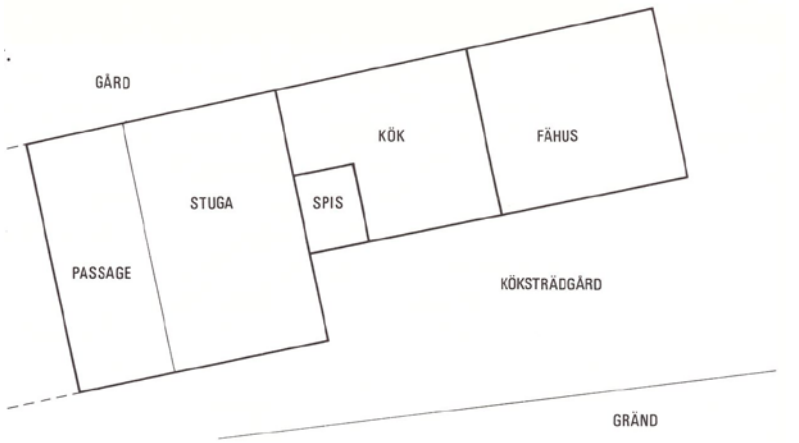
Buildings and functions

Above, we have pointed out the importance of the single context method for facilitating analysis of the *life courses* of houses and plots throughout a continuous flow of time. This is the most significant contribution of archaeology to a source pluralistic tool kit. It helps us understand the individual house as a process involving events such as construction, use, rebuilding, use and destruction. Single context archaeology can enhance the understanding, but it can also stimulate the search for these various events. An interesting insight is that a coherent vocabulary of concepts and nomenclature, which is shared by all in the workgroup, provides an incentive to search for such a variety of events. It has been pointed out many times that different contexts have different degrees of visibility. The construction phase is often the most noticeable, therefore attracting greater attention, while traces of use are more difficult to identify. The latter may comprise dirt and accumulated layers in front of a stove, lost objects in a room, a build-up of layers in a yard or street; or perhaps traces of wear from numerous hands in a standing house. Rebuilding can be identified through added walls and generations of wallpaper, but also addition of new wooden floors and underground stove footings in the foundation of the house (Tagesson 2019). As discussed above, these less manifest traces distinctly represent the contemporary gender order.

Single context recording of buildings provides the potential for understanding the material and design of a house in an entirely different way and is thereby a precondition for the comprehension of buildings as processes. Nonetheless, the method is not sufficient in itself but needs to be supplemented by the analyses discussed here. Instead of considering the type or layout of the house, the







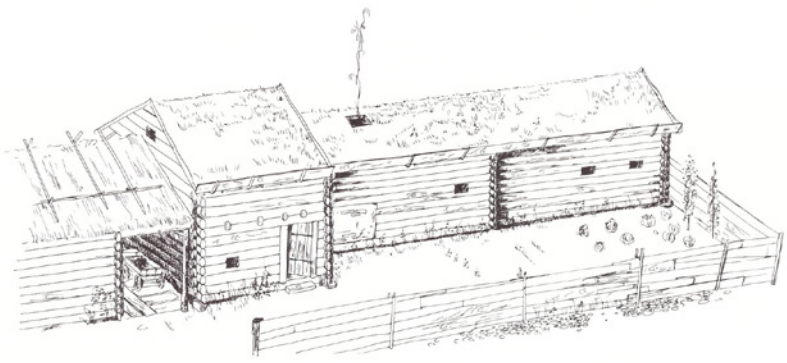


Fig. 4a–d. The popular science publication from 1978 of the archaeological excavations in the block Kransen in Uppsala presented the buildings in a series of bird's eye photographs, plans, interpretative plans and reconstructions. Clear and distinct – and still unparalleled? From Ehn & Gustafsson 1984.
Den populärvetenskapliga publikationen från 1978 av de arkeologiska utgrävningarna i kvarteret Kransen i Uppsala presenterade byggnaderna i en serie fågelperspektivfotografier, planer, tolkningsplaner och rekonstruktioner. Klart och tydligt – och fortfarande utan motstycke?

concept of morphology signals that the spatial structure of the building changes over time and with different users. A flexible concept of spatiality includes movement or rather possible access through various passages and connections between the exterior and interior of the house and between rooms. In the studied reports, whether it was possible to identify entrances, thresholds, and passages depended on conditions of preservation, but also on the preunderstanding and awareness of the archaeologists. Progress has been made on this point through single-context archaeology; hardened surfaces at entrances and trampled layers indicate not only possible but real patterns of movement in the houses.

Numerous passages were discovered in recorded buildings in the archaeological documentation; this has been essential for discussions on the morphology of the buildings. It has been possible to observe that the number of rooms and passages in houses increased during the period 1600–1850. In turn, this is an indication that the complexity and spatial depth of the houses increased during this period, which means a greater variation when it comes to both small and large houses. These observations correspond to the picture that can be seen in standing houses (Lindström & Tagesson 2025).

With the help of an extended tool kit, it has become clear in our project that the variation in seemingly uniform and anonymous houses has increased over time. To understand, describe and explain variation has become one of the main objectives in investigations. In the archaeological interpretations of the studied reports, it is evident that there has been a change in approach to urban houses, from the general conclusions and uniform descriptions of earlier years to a greater emphasis on dissimilarity and individual differences in later years. Consequently, this enables a discussion on local variation among the five towns.

In this current project, we have observed a distinct pattern among the larger houses in the studied towns; specific house morphologies became characteristic for certain town environments. The large wooden houses with a six-room layout, which were common in Linköping can be mentioned, or the large wooden houses with a long entrance hall in Kalmar. While smaller houses had more individual differences, there was less variation among the studied towns (Tagesson 2016; Lindström & Tagesson 2025; Eriksdotter & Tagesson *in prep*.). On the other hand, in the analysed reports of archaeological excavations, it is relatively rare to find discussions and explicit interpretations of the design and form of the houses, whether according to earlier ethnological types or as morphology. A few exceptions occur, usually referring to single-room houses (Sw. *enrumshus*) or two-room houses (Sw. *enkelstugor*), but without a closer definition of these house plans. In some cases, definite misunderstanding of the ethnological types occurs, leading to confusion and making it impossible to identify similarities or differences.

In the documentation from Kalmar, there are several different houses that could be labelled as traditionally designed single-room or two-room houses. A more detailed archaeological analysis of these houses instead reveals several distinguishing features. For example, some of the houses with a two-room plan do not only have the traditionally placed central entrance hall, they also have a door straight from the yard. Other houses have a variety of entrances from different sides of the house. These buildings have evidently been designed in a more dynamic way and are not fixed uniform types according to a traditional model (Tagesson 2016; Lindström & Tagesson 2025).

Our method of analysis also enables the discovery of unique morphologies in buildings. In the plots of the block Dolken in Jönköping, several buildings with interesting characteristics were recorded in the 1980s. The nearly quadrangular houses, 9x9 metres in size, were almost identical, all having a large room containing a combination of an open fireplace and tiled stove. The entrance was placed in the gable-end of the house close to the fireplace. Two doors from the main room led to two unheated small rooms (fig. 5). Several of the houses were placed as mirror images of each other. The recorded buildings belonged to a textile manufactory established in 1620 with the help of recruited craftsmen from Germany. It is not known if this singular house plan reflects German traditions or has a different origin. In this context, the point is that this exceptional morphology could be identified only when the archaeological report was studied in detail and through an analytical comparison of the morphology of all the recorded houses in the five towns.

Fig. 5. Buildings from the town plots in the block Dolken in Jönköping. From Stibéus et al. 2009. Note the hand-made drawing that enables later analysis of the construction and morphology of the buildings for a new interpretation.
Byggnader från tätortstomterna i kvarteret Dolken i Jönköping. Från Stibéus et al. 2009. Notera den handgjorda ritningen som möjliggör senare analys av byggnadernas konstruktion och morfologi för en ny tolkning.

A challenge is to understand the function of the buildings and rooms in the archaeological record. Our source pluralistic method illuminates a general diversification of functions during the studied period. Over time, the houses came to have a greater number of smaller rooms that were more functionally specialised. These conclusions can be reached through a combination of spatial analysis of the morphology and the study of written sources. In probate inventories from people who lived in the larger houses, we can trace specific designations of rooms, such as *förstuga* (vestibule), *sal* (parlour), *förstukammare (*room next to the vestibule)*, stuga* (main room), *förmak* (drawing room), bedroom, *kammare* (small room) and kitchen etc. The smaller houses are less specific, with rooms such as kitchen, *stuga* (main room), and *kammare* (small room).

We see that houses and rooms had certain functional denominations, but uses were considerably more varied in reality. This is a critical point in the archaeological record when attempts are

made to examine function. Functional differences can, for example, be traced through the occurrence or lack of footings for kitchen stoves, ovens or tiled stoves. The earliest room to be separated off from the previously multi-purpose main room, in the sixteenth or seventeenth centuries, was the kitchen for cooking and food preparation, while the main room was used more for living and working. Heating is usually considered a precondition for the classification of a room for dwelling, although written sources indicate the occurrence of unheated guest rooms or bedrooms. There are many examples of seasonal variations. It is thus not a simple procedure to determine where people in historical times slept and worked.

The morphology and construction of houses can be considered when discussing variety in function. In several archaeological excavations in the studied towns, differences can be seen in foundations and construction methods used in dwelling houses and in outhouses. Dwelling houses all seem to be log constructions with corner joints built on stone foundations, whereas outhouses were lighter timber-framed constructions. However, it is not always possible to determine the construction method. Conversely, if the function of the building is determined according to how it was built, this would be an argument based on circular reasoning.

The occurrence of stables, barns and other buildings for domestic animals is a particularly difficult problem. Written sources provide evidence of a rich presence of domestic animals in the studied cities. Even so, buildings that can be understood as having housed animals are scarce. Examples are conspicuously few; occasional stables were discovered in Jönköping and Kalmar (Stibéus 2012; Tagesson & Nordström 2012).

Discussions about the function of rooms in earlier research were supported by studies of artefacts. With a growing awareness of the significance of depositions in the stratigraphy, these analyses have been possible to refine. However, the majority of artefacts that can be determined as to function have been deposited in secondary or tertiary cultural layers with minimal significance for understanding the function of the room. In a few cases, objects discovered in primary cultural layers, such as floor layers (layers deposited on top of the floor) or layers resulting from use (such as waste spilled from the stove), can provide evidence in discussions about room function. Nevertheless, in the reports from archaeological excavations that we have studied, it has been found difficult to put this into practice, even if there are exceptions (Bäck, Heimdahl & Vretemark 2016; cf. Öbrink & Rosén 2017).

Similar challenges arise in the studied excavations in the case of macrofossil analysis. Considerable progress in the application of macrofossil analysis has been made during the studied period. Earlier, the cooperation between archaeologists and paleo-botanists was limited to sending soil samples and receiving results as lists of species in Latin. From the beginning of the 2000s and onwards, this has grown into an integrated teamwork. The first time this is seen in our examination of the documentation was in 2000 during the excavation of plots in the block *Konstantinopel* in Norrköping. An integrated work routine including targeted sampling, along with wet sieving, and identification of species in the field, with immediate feedback to the archaeologists, is standard nowadays. First and foremost, these excavations have been essential for the development of green archaeology in the sense of investigations into cultivation and food preparation at town plots (Heimdahl, Menander & Karlsson 2005).

In excavations in Kalmar, macrofossil analysis could be used to find evidence of the presence or absence of food preparation in kitchens and around stoves (Heimdahl 2014). In the plots of the Diplomaten block in Jönköping, the lack of traces of food preparation in houses and yards was seen as an indication that people did not live in the buildings. These conclusions were thus significant for interpretations of the function of houses and plots in the town environment (Heimdahl & Vestbö Franzén 2009: 35). In Vadstena, the morphological analysis of 16th-century houses indicated that the main room had been divided into a room and a vestibule, both containing stoves. This might be understood as an early division into main room and kitchen. Unfortunately, no macro-fossil analysis was carried out to verify this interpretation (Hedvall 2006). Notations in written sources mention separate kitchen buildings in the 17th century. A separate kitchen building dating from the early 18th century has been preserved in the Gamla Linköping Open-Air Museum. Similar separate kitchen buildings have been identified at the archaeological excavation of the town plots

of the block *Gubben* in Norrköping; this interpretation was further supported by written sources (Carlsson ed. 2014).

Another example of challenges in the interpretation of buildings is in the case of complementary dwelling houses that were identified in Kalmar. Smaller buildings had been built in the yard of other houses. Stove footings with evidence of food preparation, as well as the lack of clear signs of any workshop, led to the understanding that these were dwelling houses. An essential part of the interpretation was that these complementary dwelling houses could be identified in written sources. Moreover, household reconstructions could show the presence of several households at a time corresponding to the construction of these extra dwelling houses. Preserved standing buildings in yards, primarily in Linköping, have also been confirmed as having been built as complementary dwelling houses.

Even the function of buildings as workshops and other work-related uses can be difficult to verify. The number of workshops in the studied reports are conspicuously few. The workshops of weapon smiths in the town plots of the *Apeln* block in Jönköping are perhaps the most evident example (Haltiner Nordström & Pettersson 2014). At a plot in the *Dalkarlen* block in Norrköping, parts of a smithy were excavated, which could be related to the forge welding of an armourer. It was the presence of slag from forge welding that suggested the interpretation. In this case, the rich occurrence of slag in various contexts near the house is interesting. The slag occurred mainly in tertiary contexts, in filling under the surfaces of yards and streets. Consequently, it could not be directly connected to the function of the building. Nevertheless, traces of the brittle forge welding slag, easily crushed when trodden on, were discovered in a corner of the smithy; this led to the conclusion that the building had indeed been a smithy (Hållans, Karlsson & Tagesson 1999).

A particular difficulty is to discover dwelling functions in outhouses. The occurrence of small rooms for people to live in can be seen in written sources and appears to have become more common during the 19th century. One-room accommodations have been identified in an outhouse at a plot in the *Apeln* block in Jönköping (Haltiner Nordström & Pettersson 2014). In a house at the *Dovhjorten* block in Jönköping, macrofossil analysis indicated that the four rooms of the building had specific functions (Bramstång Plura, Carlsson & Rosén 2013: 68).

In sum, based on the studied archaeological excavations in five towns, it is evident that a spatial analysis of the morphology has illuminated changes during the studied period involving a gradually more complex spatial differentiation. A greater number of rooms were constructed in buildings with a more complex layout and a deeper structure where it was possible to move more easily between the rooms (see fig. 6 for an illustrative example of urban building diversity). Such tendencies in the archaeological material can be compared with similar tendencies in standing buildings and can be further supported through the integration of historical sources. On the other hand, the tool kit applied for the functional analysis of individual rooms still appears to be insufficient and in need of improvement. Advancements in the methodically integrated cooperation with macro-botanists, but also osteologists and other specialists, enable investigations into consumption, production, growing vegetables, and handling waste at the town plots. However, procedures for identifying the function of rooms and the way this varied over time still remain to be improved. Better knowledge of flexible use of rooms and variations in function also means that we must keep a critical attitude towards all forms of simplified analysis of function.

Construction of buildings and construction methods

Which traces of construction methods and design of buildings do we see in archaeological contexts? Our integrated studies of standing buildings, combining examinations of morphology and crafts, have illuminated changes in social practice during the studied period, which is also supported by written sources. This includes a variety of technical arrangements, details representing technical, aesthetical or individual differences between houses, between towns and over time (Almevik 2012; Tagesson, Qviström & Hallgren *in prep.*).

The foundations of a building are vital for studying the construction phase. In the analysed reports, a variety of foundations occur, such as

sill stones, stone foundations, construction layers, etc. Foundations of buildings are liable to be described and identified in an unreflected routine manner, resulting in an impression of similarity without variation, suggesting uniformly built houses.

At the town plots of the *Diplomaten* block in Jönköping, the excavation of house foundations was based on systematic terminology and consideration of how the foundations were constructed. Cornerstones were understood as a sign of skilled carpentry while bearing posts dug into the ground in combination with sill stones, which were perceived to indicate timber-framed outhouses dating from both the 17th and 18th centuries. The absence of foundations was seen to represent inadequate construction methods, while a foundation of small stones was considered to be intended for a one-storey house (Nordman & Pettersson 2009: 97). At the town plots of the *Konstantinopel* block in Norrköping, the archaeologists have also particularly studied methods of constructing foundations. During the medieval phase, there was a striking mixture of methods for constructing foundations including well-built stone sills, standard stone sills, buried stone sills, spaced-out sill stones or timber sills without stones. During the early modern period, methods for constructing foundations became more homogenous, and houses were consistently built on stone sills (Karlsson, Menander & Heimdahl 2006).

An interesting result is that differences between house foundations in the early modern period do not appear to be so significant. Nevertheless, there is no conclusive evidence of deviations from the general conclusion that log buildings with corner joints, stone foundations, and heating can be understood as dwelling houses, while alternative, simpler construction methods, such as timber-frame structures, represent buildings for other uses. In this context, individual cases of inadequate foundations are extra striking. At the *Bokbindaren* block in Linköping, a dwelling house from the 1620s was recorded; it had sill beams that were placed straight on the ground without any trace of a stone foundation or sill stones.

In the 18th century, a noticeable change in construction methods occurred when more substantial stone foundations or stone walls became common. At the *Ansvaret* block in Jönköping, stone foundations were found to be supported by a groundwork of piles in the unstable ground near Lake Munksjön. Similarly, stone foundations tended to become more substantial in Norrköping, too (Stibéus 2012). This change has been difficult to prove; however, excavations of early modern houses have been concentrated in areas where buildings were smaller, while larger houses and those from later periods are underrepresented in the archaeological record.

The foundations of a building comprise not only the actual sill but also the groundwork in the form of construction layers. In many cases, the construction of a house was preceded by levelling the ground in various ways, often the entire plot or parts of it. With the use of the single-context method in the 1990s and later, it was revealed that levelling the ground was much more common than previously noticed. Considerable parts of the new town of Jönköping, to the east of the old town, were built on wetlands. Extensive groundwork was carried out, and the ground was levelled with the help of caissons filled with stones and brushwood. Caissons were used in a few other places, for example, under the town plots of the *Ansvaret* block along the street *Smedjegatan*, where the plots were gradually built up towards Lake Munksjön (Stibéus 2012; Nordman 2014). The bay of Malmfjärden in Kalmar was filled in by means of similar caissons when reclaiming land for the blocks named *Gesällen* and *Mästaren* (Tagesson 2016).

There were also many plots in the other towns where levelling and grading of sand and earth layers had been carried out. The construction of individual houses was commonly preceded by specific levelled layers, often termed construction layers, onto which sill stones and stone sills had been placed. At a few sites, previous ground layers had been dug out and replaced by sand, referred to as *sunken foundations*. Presumably, it was a case of removing earlier humus-rich cultural layers to achieve a dry and clean surface where the stone foundation of the house could be placed. Most likely, this was a common occurrence even if it has not been identified in earlier archaeological excavations (Nordman & Pettersson 2009: 86, 94, 99).

Fig. 6. A section of Norra Långgatan, Kalmar. Houses with the gable end facing the street, and a high wooden fence with a door leading into the narrow yard. Every house and plot has its specific life course and biography – a challenge and an opportunity. Photo Archive of Kalmar läns museum.
En del av Norra Långgatan, Kalmar. Hus med gaveln mot gatan, och högt staket i trä med dörr som leder in till den smala gården. Varje hus och tomt har sin specifika livsförlopp och biografi – en utmaning och en möjlighet.

Back to the trench

In this article, early modern buildings in the currently extensive archaeological record have been discussed. The study is based on an analysis of all relevant archaeological excavations conducted in five towns: Kalmar, Linköping, Norrköping, Vadstena, and Jönköping. It covers the years 1982–2015, which was a momentous period in Swedish archaeology in a time when early modern urban history was established as a discipline in its own right. Methodological awareness and progression became visible, and methods grew to be more pronounced and precise at the same time as developments in archaeological recording techniques were extensive.

The study is part of the project HASP, which foregrounds the integration of research on preserved buildings, archaeology of remains below ground and of standing buildings above ground, along with sociohistorical studies. By combining the physical remains of houses with historical household reconstructions based on written sources, we have been able to shed light on the function of houses as places where people lived their lives. We have shown that the houses and their spatial structure changed during a period when social life and the composition of households, people's ways of living together, were dynamically transforming (figure 6).

Altogether, this integrated analysis of buildings archaeology and historical studies is shown to enable the study of how people and houses influence each other in what we recognise as social practice.

We can state that archaeological excavation of building remains has an important role in integrated buildings archaeology. We can also state that buildings archaeology is in need of a methodological upgrade. For the future, it is crucial that archaeology of remains below ground and buildings archaeology come together into an integrated discipline.

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The King's Own City – archaeology in the fortress town of Christianstad

By Claes Pettersson

Fig. 1. The Fortress Town at War. Christianstad during the assault by the Danish army in August 1676. Painting by Claus Møinichen 1686-1688. Photo: The Museum of National History, Frederiksborg Castle, Denmark.
Den befästa staden i krig. Christianstad under den danska arméns anfall i augusti 1676.

A problem and a solution

What was the reason behind the foundation of Christianstad by the Danish king Christian IV in 1614? Why was it considered so important to invest in a fortified town here, in the middle of vast wetlands next to the Helgeå River? The answer lies in the devastation during the Kalmar War (1611–1613). Here, in the northeastern corner of the province of Scania, a Swedish campaign brought havoc to this densely populated region (Andersson 1964; Andersson & Lindblom 1976: 38ff; Harrison Lindbergh 2022: 135ff). In the words of Gustav Adolf, the young Swedish king, himself:

"We hereby inform you that we have been to Scania, and have put most of it to the torch; 24 parishes and the town of Vä were burnt to ashes, and while doing so we met no resistance, whether from cavalry or foot soldiers, so we have laid waste, plundered, burnt, and killed just as we pleased… Gustav II Adolf in a letter to Count Johan of Östergötland, dated February 1612". (Translated by the author)

It was obvious that the border defences had to be strengthened. As a solution a chain of fortresses or fortress towns were built or modernized during the reign of Christian IV. Among these were Varberg, Halmstad and Laholm in the province of Halland, Christianstad in Scania and Christianopel to the east in Blekinge (Friström 1996: 44). However, they represent only a fraction of the more than thirty major building projects focusing on the defence and development of the realm effectuated during his six decades on the Danish throne.

Swedish countermeasures of a similar kind can be seen in Gothenburg with Elfsborg castle in the west, Jönköping in the centre and Kalmar on the east coast (Bramstång 2006; Nordman, Nordström & Pettersson 2014; Tagesson & Carelli 2016, Stibéus & Menander 2022). Here old, well-established towns were abandoned in favour of new foundations, situated in a better location from a strategic point of view. These fortified towns with modern fortresses were intended to close the major roads against an advancing enemy. At least, that was the strategy. In reality, however, many of the grand projects on either side of the border remained unfinished as a result of insufficient resources or changes in the political realities (Pettersson 2018).

These fortified towns can also be regarded as representing a new kind of urbanity. Being projects controlled and financed by the absolute state, new ideals for town planning could be applied, such as a strict geometric plan with rectilinear

blocks and straight streets, unlike older, slowly developed townscapes that were better adapted to topographic conditions (Ersgård 2018). Their strategic value was combined with being nodes for administration and trade, arenas for international contacts where soldiers, officials, tradesmen and different kinds of specialists passed through or stayed (Pettersson 2018). The creation of a firm urban structure also facilitated control of resources and people in the rural hinterland by the government.

A fortress in the wetlands

Christianstad received its charter and privileges from Christian IV in 1614. As a direct consequence, the medieval towns of Vä and Åhus lost theirs in 1614 and 1617, respectively. The inhabitants were ordered to move to the new town or lose their status as burghers (Andersson 1964; Andersson & Lindblom 1976: 52–54).

The new fortress was built on a small island or peninsula called Allön, situated in the wetlands right next to the Helgeå River. It became a strongly fortified town in the Dutch fashion, surrounded by ramparts six metres high, ten bastions and two gates protected by ravelins (free-standing barbicans). The completed Christianstad was a modern state-of-the-art fortress of its time, a garrison town relying on artillery to keep an advancing enemy at bay, using water and vast tracts of wetlands as a first line of defence (Friström 1996).

Inside the walls was a civilian settlement measuring some 700×300 m. It became a new administrative centre for the region from where control of trade routes and important roads could be maintained. A strategic node for communication on land and water had been established (Pettersson 1996). By building on a virgin site like Allön, the principles of the Renaissance ideal city could be applied to the fullest, as can still be recognized today (Lindhagen 1993; Stewenius 1984).

But the fortifications surrounding the civilian settlement became an obstacle to further expansion as the limited area within the city walls with the 192 plots was all that was available for the years to come, until the then obsolete fortifications were demolished in 1847 (Edring 2018). In the early modern fortified towns, the growth of suburbs was restricted or discouraged, while modernization of the defences meant new outworks and moats constructed on land formerly used as gardens, fields and meadows (Legut-Pintal & Podruczny 2024).

Christianstad was protected by water but was also cursed by it. Recurrent floods in spring were something the inhabitants had to accept. And Christianstad still has the lowest recorded spot in Sweden within the city limits, 2.32 m below sea level (Pettersson & Jonsson 2018: 9).

The beginnings – clay, sand and branches

During the last decade, the outline of the Allön peninsula has been mapped. It became evident that solid ground within the walls was to be found only in the northern part of the area, from Holy Trinity Church to the bastions and walls flanking the Norreport gate (Ohlsson & Pettersson 2018: 22–23; Pettersson, Larsson & Liahaugen 2023: 28–33). The rest of the civilian settlement as well as the fortifications had to be constructed on landfill. In excavations undertaken in the main streets, Storgatorna, and blocks like the Hovrätten site, thick beds of twigs and branches have been found (fig. 2), spread out on the natural clay to carry the weight of the landfill consisting of up to one metre of sand (Svensson, Pettersson & Larsson 2020: 38–39; Svensson 2018; Pettersson 2019a). These massive layers of soil had to be brought in by cart or barge and put in place before any houses could be built or streets laid out.

For about a decade, Allön became a gigantic construction site with the church, the rectory, the town hall, the armoury and other official or civilian buildings taking shape inside walls and ramparts that were building sites themselves (Rosenberg 2006). The logistics included in a mega-project such as this required the mobilization of a whole region and its population (Andersson 1964; Friström 1996; Nordman 2014). In addition to the labourers employed in the town, a considerable workforce was needed to extract the building materials and for the transport on land and water. All facts considered, it is impressive that under these circumstances, a functioning and defendable town was created over a period of about fifteen years. The walls and bastions around the civil settlement were regarded as fully completed around 1640, just in time before war broke out once more in 1643 (Friström 1996:46).

Fig. 2. Landfill. A bed of branches and twigs under a thick layer of reddish sand. The foundation laid out before houses and streets could be built. Photo: Sydsvensk Arkeologi.
En bädd av grenar och kvistar under ett tjockt lager av rödaktig sand. Den grund som lades ut innan hus och gator kunde byggas.

Major changes were to occur in 1658, when the Roskilde Peace Treaty caused Christianstad, together with the rest of the province, to become a part of Sweden. The unstable political situation soon led to yet another conflict, the Scanian War (1675–1679), fought with a brutality seldom seen before in Scandinavia (Rystad 2005; Knarrström & Nilsson 2019). Here Christianstad became something of a focal point; captured by Danish troops in mid-August 1676, it had to endure a long siege from October 1677 until the garrison was forced to surrender on 4 August 1678 (Persson & Juhlin Alftberg 2014).

After the war, when both Christianstad and the province of Scania were firmly back under Swedish control, the fortifications were to be razed or dismantled (Friström 1996: 54). However, this seems to have been only partially carried out. Most likely the ramparts and bastions were just left untended for years to come. That both the fortifications and the readiness of the garrison were of substandard quality is shown by how easily the town was occupied once more by the Danish army in 1710 during the Great Northern War (Skjold Petersen 2017: 77–79).

Fourteen years later the Royal Commission on the Defence of the Realm inspected and evaluated all existing fortifications within the Swedish borders, Christianstad among them. The verdict given in the report dated 15 December 1724 is harsh but understandable. The town fortifications are described as outdated, weak and partly in ruins. However, the strategic value of the fortress is seen in conjunction with Landskrona, situated on the coast of the Öresund strait, the border between Denmark and Sweden. The commission suggested that a new fortification should be built there and given an active role in controlling the waterways and the coastline. Christianstad was to act as a strong but retracted base for the army with storage facilities, capable of both blocking the way for an advancing enemy and supplying the Swedish forces fighting in southern Sweden (von Kartaschew 1994: 133–137).

Due to the financial situation in Sweden the plans were not effectuated until more than two decades later, when another catastrophic war against Russia (1741–1743) had demonstrated the need for radical measures. After a decision in the Swedish Parliament in 1749 the rebuilding, modernization and enlargement of the fortifications around Christianstad began (Friström 1996: 56–57). The original plan from the days of Christian IV (fig. 3a) was radically altered during a period of construction that lasted from 1750 well into the 1790s (Edring 2018: 7–9). Walls and ramparts were raised, but first and foremost, new outworks and moats widened the fortifications and moved the actual first line of defence further away from the civilian settlement (fig. 3b). The reason was that the range of the siege guns had increased significantly since the 17th century. Higher earthworks had to be constructed in defence of the city, and secure positions for heavy defensive artillery had

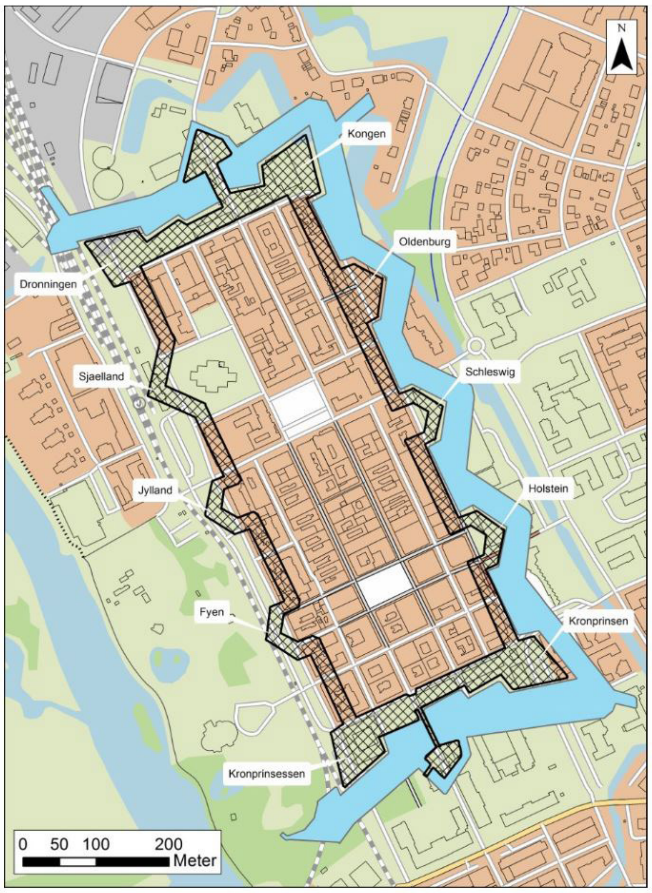

Fig. 3a. Christianstad. The original layout of the fortifications (1618 – 1748).
Christianstad. Den ursprungliga utformningen av befästningarna (1618-1748)

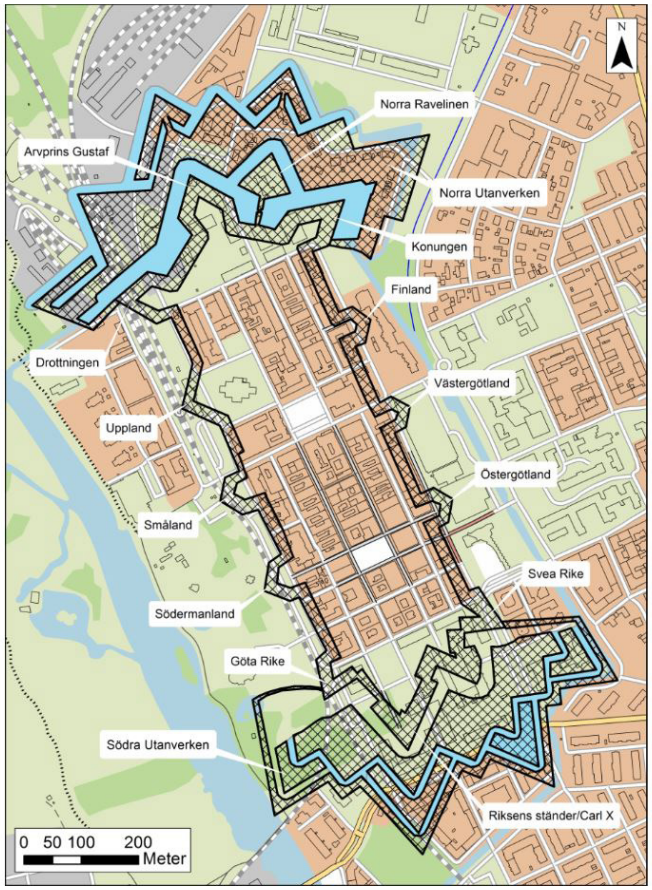

Fig. 3b – Christianstad. The modernized and enlarged fortifications (1749 – 1847).
Christianstad. De moderniserade och utbyggda befästningarna (1749-1847)

to be incorporated in bastions, ravelins and other complicated works belonging to the modern art of fortification (Friström 1996; Mårtensson 1996; Rosengren 2017). The size of the civilian settlement was unchanged, however, still measuring its original 700×300 m.

In the 1750s, however, the threats to the Swedish realm had changed dramatically. Denmark was on the decline from a military point of view, as was Sweden. Imperial Russia was the more dangerous enemy. In Scania, the new Gråen or Adolph's fort in Landskrona, intended to close the Öresund, was left unfinished. Instead, money, including large amounts of French subsidies, was poured into the gigantic fortress soon to be known as *The Gibraltar of the Baltic*. Sveaborg (*Suomenlinna* in Finnish), built to protect Helsinki and to serve as a naval base for the new Army Fleet, blocking the Bay of Finland against the Russian navy. In the meantime, Christianstad continued to play a significant role as a garrison and storage fortress for the army (Pettersson 2023).

Despite Sweden being involved in wars with both Russia and Denmark-Norway, things remained quiet in northeastern Scania. In 1775, the water level in the Helgeå and its adjoining system of lakes was accidentally lowered permanently by about 0.7 m as an unforeseen consequence of a land reclamation project (Friström 1996: 61). This affected the moats and may have been a reason for slowing down the enlargement of the fortress. However, the more volatile methods of warfare in the period also made large and costly permanent fortifications outdated in many respects. Finally, the fortress in Christianstad was declared obsolete and went out of commission in 1847.

Holy Trinity Church

One of the first – and definitely largest – buildings to be erected on Allön was the new church, Holy Trinity. During a decade between 1617 and 1628, it slowly took shape in what was probably the best spot within the area occupied by the civilian settlement. Today, it stands as one of the finest examples of the so-called Christian IV Renaissance architectural style. Large windows and elaborate gables characterize the exterior, while the slender black columns supporting the vaults catch the eye on the inside (Andersson 2012). However, the upper part of the west tower and the spire are 19th-century additions.

In 2012, the western part of the churchyard, originally an integrated part of the Zealand bastion, became the scene of the first large excavation undertaken in Christianstad (Björk & Nilsson 2012). Here, a total of 104 burials were found, several of them dating from the 17th and 18th centuries. It seems that this part of the large cemetery might have been reserved for the soldiers of the garrison. Graves with more than one interred body were found, as were uniform buttons, gun flints and musket balls. Some of the individuals were obviously interred fully clothed, with some belongings still in their pockets. It is certainly tempting to interpret these finds as grim reminders of the long siege of 1677–1678 when the Danish troops were cut off in the occupied town. Written sources tell of starvation, fighting among the men and death from diseases (Persson & Juhlin Alftberg 2014). It must be noted, however, that this part of the graveyard also held the remains of some women and children, perhaps the families of soldiers from the garrison.

Another important excavation was undertaken in the then redundant graveyard between 2018 and 2019. The decrepit-looking area outside Holy Trinity Church was restored and put back into use with a site reserved for new cremation burials. The pits dug for trees, as well as the trenches for drainage, sewage, and various kinds of electrical installations, led to the discovery of numerous graves. Some of these burials date back to the first half of the 17th century, maybe even before the church itself was consecrated. Furthermore, pits with debris from the renovation of the church in the late 19th century were found, containing pieces of large baroque grave slabs once commemorating wealthy burghers, officials and high-ranking officers – individuals whose mortal remains had been cleared out of the nave and dumped in pits outside the walls of the church (Larsson in prep.).

The excavations at the Holy Trinity graveyard have resulted in ongoing studies of the health situation and the diseases that the inhabitants of Christianstad had lived with and suffered from. In this connection another excavation should be mentioned. In 2018, the Hovrätten site was excavated. Here, the large late 18th-century garrison bakery once stood, together with army storage facilities and a combined mess and infirmary building. This was a site of vital importance for the daily life of the common soldiers and the regiments stationed there (Pettersson 2020). However, sample staken from the layers in one og the wells at the bakery site provide a result that says a great deal about the living conditions for the soldiers of the garrison. A direct quotation from the parasite analysis is almost too revealing:

"Here was found the most abundant presence of whipworm (Trichuris trichiura) and roundworm (Ascaris lumbricoide) eggs seen in an analysed sample." (Jonas Bergman, SHM)

This result does not fit in well with the interpretation of a site where food for the soldiers was prepared and stored.

Fig. 4. The Rectory (1617-1677). A reconstruction of the excavated building complex. 3D: Jimmy Juhlin, Regionmuseet Kristianstad.
Prästgården (1617-1677). En rekonstruktion av det utgrävda byggnadskomplexet.

The Rectory

The first Rectory in Christianstad was built between 1617 and 1620, but despite being a fine residential building, timber-framed with brick walls, it had a short lifespan (fig. 4). The houses on the site were all demolished during the siege of 1677–1678 when the building materials were used to strengthen the town walls or needed as firewood in the harsh winter. But it had been one of the finest buildings in the early town, sometimes used as a residence by Christian IV himself during his visits to his new fortress town (Pettersson 2019b).

The excavation in 2015 was actually the first urban archaeological project in Christianstad where a stratigraphic method was consistently used. The results gave a good picture of what a wealthy household might contain in terms of house plans, finds and indications of contacts near and far. In the layers of debris, substantial amounts of reused building materials were found, including medieval profiled bricks for vaulting and exclusive glazed tiles for tile ovens (fig. 5) of a late Renaissance/early Baroque style (Ohlsson & Pettersson 2018).

Oral traditions tells of how building materials were brought in from the towns of Vä and Åhus. Both were abandoned through a royal decree that forced the inhabitants to move to the new fortified town of Christianstad, on pain of losing their rights and privileges as burghers.

In Åhus one of the buildings dismantled was the former Dominican Friary, transformed after the Reformation into an administrative centre. This large building complex had comprised four wings with a one-aisled church forming the northern side. Between 1617 and 1620 it was reduced to rubble, with its remaining foundations hidden below ground (Pettersson 2024). The suggested timeline that links the former friary as a source of building materials for the Rectory in Christianstad fits perfectly.

How to do archaeological research in a 17th-century fortress

Today, little remains to be seen above ground of the historical fortifications in Christianstad. Only a section of the moats in the northwestern part of town still exists, while the walls, the city gates and the bastions have all disappeared together with the once impressive ramparts. These were all demolished during a period of about fifty years after the fortress was declared redundant in 1847. However, a bastion that was reconstructed – without a prior excavation – in the 1990s might give a visitor a glimpse of what the earthworks around Christianstad looked like. However, from the archaeological record collected during the last twenty years, it is obvious that substantial parts of the fortifications still exist below ground (Edring 2018).

What is the best way to approach these hidden remains in planning and excavation? Randomly placed trenches dug in a site containing remains of 17th- and 18th-century fortifications might present a quite confusing picture, as the earthen walls were built using clay and gravel dug from the moats. When these fortifications were razed in the 19th century the same materials were used to backfill the moats. Here, a combination of written sources and geophysical methods makes the task of interpretating the remains a lot easier.

Contemporary military maps and drawings, made during periods of building or maintenance, provide part of the solution. The Swedish War Archives have a collection of almost 1500 files concerning the Christianstad fortress during the Swedish period (fig. 6). The rebuilding campaign of 1748–1790 has the most plentiful documentation as the people responsible on site had to submit written reports and drawings every year to the King, his Council, and other authorities in Stockholm (Bojs 1996; Edring 2018: 34). These detailed depictions have been proven to be highly accurate, an invaluable resource for the archaeologist. Today, they are available for download, free and in high resolution. However, these maps and the written descriptions accompanying them must be used carefully, as they represent an ideal picture of what was to be built or was under construction. They were made for the eyes of the authorities in Stockholm, and simplifications or practical solutions were often omitted. The question of the reliability of the source material must therefore always be considered.

The next step is to map the hidden remains in the area due to be developed with ground-penetrating radar (GPR). This method has been used as a tool for finding walls, moats and earthworks in the town fortifications of Christianstad since 2016 (Pettersson & Winroth 2016, 2020a, 2020, 2021). If the results of the GPR mapping are combined with rectified 18th-century maps and drawings, it

Fig. 5. A large, black-glazed oven tile depicting the Crucifixion. Found in landfill at the Rectory site. Photo: Sydsvensk Arkeologi.
En stor, svartglaserad ugnskakelplatta föreställande korsfästelsen. Hittad vid Prästgården.

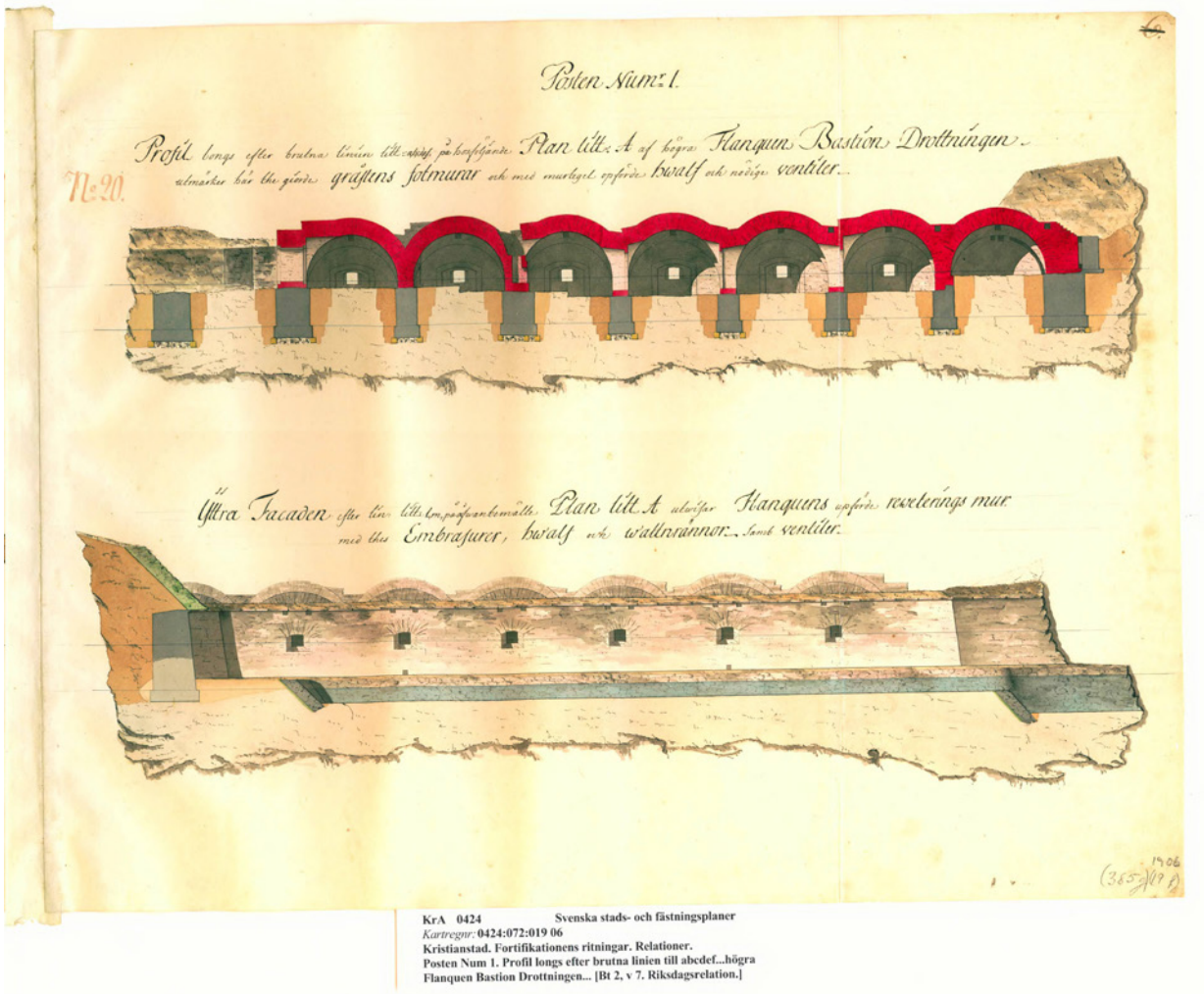

Fig. 6. Drawings of the casemates in Bastion the Queen. Today in the Swedish War Archives, Stockholm (Series SFP, ID K0031163).
Ritningar av kasematterna i Drottningens Bastion.

Fig. 7. Fortifications under the asphalt. Excavations in Bastion the Queen in 2022. Photo: Sydsvensk Arkeologi. *Befästningar under asfalten. Utgrävningar i Bastion Drottningen 2022.*

becomes possible to identify the anomalies seen on the screen. Small, single-channel rigs have proven to be useful and most suitable for the limited spaces within built-up areas. This combination of methods saves time and money when used in complicated contexts such as these.

A method that Sydsvensk Arkeologi started to use as recently as 2021 is reading the cores from drilling on sites that are to be developed. Today, most areas within modern urban contexts are seen as possibly contaminated, thus making an environmental analysis necessary. If the rig used for drilling and collecting samples is accompanied by an archaeologist who can document the cores taken up, there is much useful information to be gathered. A rough picture of the stratigraphy may be obtained as well as a notion of its complexity. The contents of the cores can be compared with the picture obtained with a combination of GPR and rectified historical maps (Pettersson 2021: 16–17; Pettersson, Larsson & Liahaugen 2023: 28–33). Are there any signs of building remains encountered, such as solid walls or layers of debris? Furthermore, samples for a first investigation, for example through a palaeobotanical analysis, may be collected from these cores. Rough as the method might be, it does give a good indication of whether a further analysis is worth doing.

The Queen's Bastion – a hidden ruin and a battlefield…

Let us use the Queen's Bastion (Bastion Drottningen) as a first example of the archaeological fieldwork done in the 18th-century town fortifications around Christianstad. Originally a central part of the defence, protecting the northwestern corner and the exposed northern flank, it became a battlefield in August 1676. The historical context is something that must be taken into consideration when dealing with a site such as this. What kind of objects related to the battle might be found in an excavation in this context?

In the early morning of 15 August 1676, Danish soldiers climbed the ramparts of this and the neighbouring Upland bastion, thus beginning the final assault on the fortress. The defenders were taken by surprise, but after the first confusing moments offered tough resistance during two hours of intense fighting. An estimated 500 Swedish soldiers were killed in the battle, while the Danish losses were 333 dead and about 400 wounded. The surviving 300 soldiers of the garrison were taken prisoner, and the town was left open for three hours of free plundering, with the civilians left at the mercy of the victorious soldiers, the majority being German mercenaries (Persson & Juhlin Alftberg 2014: 18–21).

After the war followed the long years of neglect and decay. Around 1748, however, the modernization and enlargement of the town fortifications started with the exposed northern front. And in accordance with the plans decided by Parliament, the Queen's Bastion was one of the first objects to be dealt with. Partly reconstructed on the original foundations, it was enlarged and provided with a vaulted casemate made of stone and bricks, built for a flanking battery of six guns. These were sup-

posed to have a field of fire covering the moat and curtain wall east of the bastion itself, thus making it possible to kill any enemy soldiers that had managed to get this far before they were able to approach the main walls. The building process for the Queen's Bastion can be followed in great detail in the plans, drawings and written reports now kept in the Swedish War Archives (Pettersson & Winroth 2020b; Pettersson, Larsson & Liahaugen 2023).

After the fortress had been declared redundant in 1847, most of the fortifications were demolished, except for the walls and outworks along the northern front. Here, the process was slowed down because this area was used by the Wendes Artillery Regiment for their stables and stores. When the new town waterworks were established on the premises in the 1870s, the former gun casemates were reused as a boiler room and workshop before being razed just after the turn of the century (Pettersson & Winroth 2020b: 19, 28).

Today used as a car park, the site of the bastion was included in the municipality's plans for a revitalization of the historic city centre in Christianstad. It was chosen for a new multi-storey car park, a decision that led to archaeological investigations as the site is a part of the protected ancient monument RAÄ L1990:493 (town fortifications). After a thorough search for contemporary maps and drawings, a GPR mapping undertaken in 2020 and a survey by drilling in November the following year, test trenches were dug in May 2022 (Pettersson, Larsson & Liahaugen 2023).

Guided by the combined evidence from rectified maps, the GPR survey and drillings, it was possible to arrive at a good picture of the hidden remains of the bastion and its adjoining ramparts despite the trenches being of a relatively limited extent (fig. 7). The bastion with its casemate was once demolished to provide space for new buildings. Consequently, the standing walls of the ruin were to be found less than 0.3 m below the asphalt. The rooms encountered in the trenches were filled with debris, with bricks and lime mortar from the destroyed vaults. The correspondence between the pictures obtained by GPR and the in situ remains found during the excavations proved to be almost 100 per cent.

However, one important deviation from the contemporary sources was also found. One would assume that the earthworks and stone walls rested on pilework and foundations of horizontal timbers as there are detailed drawings in the archives illustrating this. Nothing of the kind was found (Pettersson, Larsson, & Liahaugen 2023). The master builders must have concluded that the natural moraine would provide enough stability to carry the weight. This decision is not recorded in the official documents.

The Contregarde – the first line of defence

The second example of an excavated town fortification in Christianstad is the Contregarde, an

Fig. 8. The Contregarde. The remains of a mid-18th century rampart under excavation. Photo: Sydsvensk Arkeologi.
Contregarden. Resterna av en vall från mitten av 1700-talet under utgrävning.

earthwork intended to function as a first line of defence, protecting the northern city gate (fig. 8). It consisted of an angled rampart built with a core of gravel, clad with a 4 m thick belt of soft greyish clay on the side facing an enemy. This was a solution meant to minimize the damage of a bombardment during a siege. The clay was supposed to absorb the kinetic energy from incoming artillery projectiles (Pettersson & Larsson 2022: 5, 33).

Originally some 4 to 5 m high, including the breastworks and wall walks, 1.5 m remained of the rampart. The wide moat outside the wall was filled with modern debris with a high level of contamination. As the slowly decaying walls and moats were often used as dumping grounds for waste of all kinds, it is unfortunately not uncommon to find polluted materials in this kind of environment, making archaeological excavations hazardous. In 2021, the contaminated ground made any kind of research or documentation in the moat outside the Contregarde impossible.

The surface of the wall was covered with grass turves, each piece a square foot, stacked on top of each other (fig. 9). This was a way to protect the structure from erosion. The parts of the town defences covered in grass can be seen as green areas on 18th-century military maps and drawings.

An observation worth mentioning is that to cover just the stretch of wall excavated in 2021 (85 m) would need grass turf from 4 hectares of land. The palaeobotanical analysis showed that the turf was taken from pastures close to water, a river or a lake. Seen in relation to the vast system of walls and ramparts that surrounded Christianstad it is easy to understand the damage that was done to the environment in the region. It was already exposed to erosion and extensive soil destruction in the 17th and 18th centuries (Pettersson & Larsson 2022: 44–45). So, where did the Swedish Crown obtain all the turf needed? And who were the unlucky ones that lost so much valuable pastures? To what extent did mega-projects like this affect the hinterland and its population? That is something worth looking into more closely in a forthcoming research project!

Outside the walls

So far, we have dealt with large, manifest structures such as walls, bastions and ramparts from the two distinct phases of the town fortifications in Christianstad. Complicated as this might be, there is at least an impressive array of information and source materials of various kinds to be used when planning an archaeological excavation. But what about the areas adjoining the walls and moats, where workshops, stores and different technical devices were once used in a building process spanning decades?

In Christianstad one might expect that there should be remains of a temporary harbour in the vicinity of the northern fortifications, just as there was at Beckhovet south of the town (Pettersson

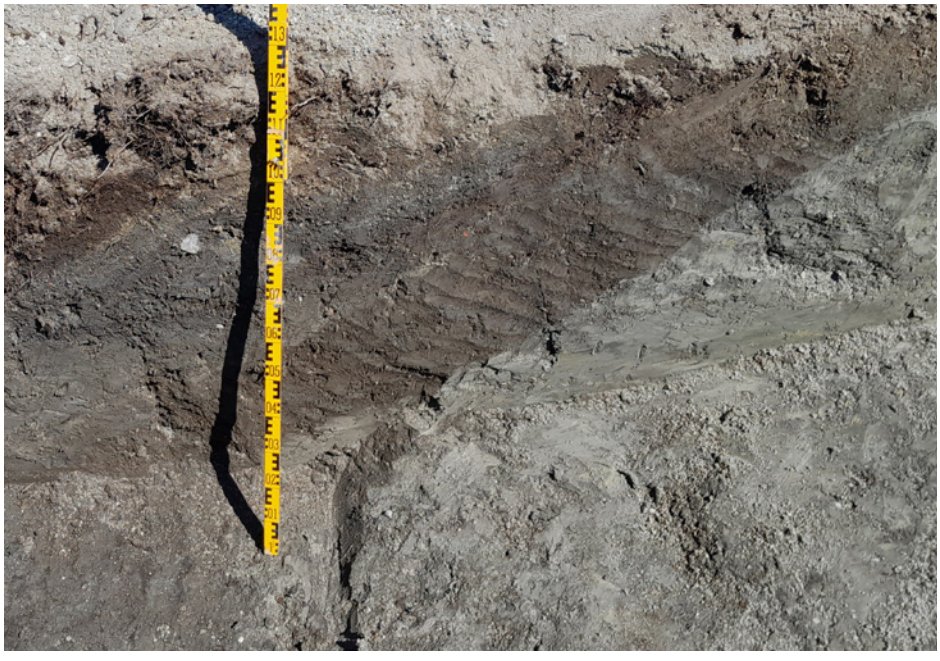

Fig. 9. The Contregarde. The surface with stacked squares (30x30 cm) of grass turf. Photo: Sydsvensk Arkeologi.
Contregarden. Vallens utsida , skyddad av staplade grästorvor (30x30 cm).

2019c). Possibly with a jetty, with stores and maybe foundations for lifting cranes and other machinery used for handling the building materials. In connection with the excavation of a wooden structure found just outside the fortress walls in 2023 a closer look at the contemporary drawings revealed new information on this topic. The presence of wind-powered pump mills had not been noticed hitherto when the maps were analysed (Pettersson & Larsson 2024: 33–34). However, there was proof of the existence of pump mills in the 18th century, used for draining sections of the moats. They were essential during the building process and likewise necessary for the maintenance of the walls (Pettersson & Larsson 2024: 24).

The discovery of these pump mills can be seen together with a temporary culvert connecting the outer and inner moat. It was observed by GPR in 2021 at the Bastion 1 site but not present in the War Archive drawings (Pettersson & Winroth 2021: 15–19). This structure might have been used for a relatively brief period of time, probably a break in the building process during a winter in the 1760s. It looks like a makeshift solution that did not need to be documented on official drawings.

Consequently, there is a twofold problem here. The pump mills were found outside the actual registered monument, in a sort of bureaucratic no-man's-land without legal protection. The other category consists of temporary solutions that may or may not have been documented during the construction period. Still, they belong to the building and upkeep of the fortification system and are definitely interesting from an archaeological point of view. They make it possible to study the construction process in detail, providing important knowledge about how the fortifications were erected, how the work was organized with its logistics and the use of raw materials. This part of the story deserves to be studied as far less is known about it than about the protected monuments themselves, the actual fortifications.

A sort of an epilogue...

Let us end this tale of a Danish fortress, built in the Dutch fashion four centuries ago in the aftermath of an almost forgotten war, with some reflections on the recent situation in the town of Christian IV. Although we might not realize it, our daily life in the 21st century is still affected by decisions made so long ago.

Amid the wetlands – today a natural reserve and attracting tourists as *The World of Water* (Internet – Vattenriket) – the site of the original fortress town stays dry, resting on the massive landfill brought here four centuries ago. But the modern Christianstad has grown considerably, and floods are something that occurs in the low-lying areas once marshes regarded as an effective first line of defence by the 17th-century fortification architects (Pettersson & Jonsson 2017). Within the historic city centre, the narrow streets with right-angled corners can cause problems for modern-day traffic. But they, too, are a heritage from a town that once hid behind imposing walls and ramparts.

During the last ten years of archaeology in Christianstad we have been able to obtain a much better picture of the fortress itself, and the methods used in its construction. We have also begun to grasp the consequences for a hinterland that was heavily affected by this early modern mega-project. Using a combination of rectified historic maps and drawings, ground-penetrating radar (GPR) and analysed cores from drilling, followed by traditional trenches, has proved to be a most reliable method when dealing with this kind of remains. An important by-product has been the possibility to evaluate the reliability of the source material available in the archives. This includes important lessons in understanding how to read and use contemporary maps and drawings. What are the advantages and what kind of problems and pitfalls must be expected (Edring 2018: 37)?

Research has also, to some extent, started to change focus by broadening the perspectives. One prominent issue that can be studied is the radical changes the urban landscape underwent in a contested border region over a long period of time. It has also been possible to conduct detailed studies of the methods used for building and maintaining a major town fortification during the 17th and 18th centuries, with the impact this had on a whole region. Quite simply, the need for building materials, logistics, and manpower affected daily life for

the majority of the inhabitants in the northeastern part of the province of Scania.

Another aspect to be investigated is life and death in a Scandinavian fortress town and how living conditions changed during periods of war and peace. This can be studied with the aid of new sets of methods available – in osteology, palaeobotany, parasite studies and other fields of scientific research.

Finally, in the last decade, Christianstad has gone from being a town with hardly any archaeology worth mentioning to become a fine example of how much new knowledge can be obtained from a fortified early modern town (Pettersson, Engkvist & Nilsson 2014). Lessons learned here and results obtained might prove to be useful in several other Scandinavian towns sharing a similar complex history, laden with conflicts and strife but also places to be regarded as testbeds for current ideas, introduced know-how and other aspects of modernity.

Summary

In the aftermath of the Kalmar War, the Danish king Christian IV decided that the defence of the northeastern part of the province of Scania had to be strengthened. This exposed border region needed a strong point, a replacement for the medieval towns – Åhus and Vä – of which the latter, along with over twenty parishes, had been devastated by the Swedish army. In 1614, Christianstad was given its municipal charter. It was founded on a strategically well-chosen site, Allön – a peninsula in the wetlands next to the Helgeå River. Here the roads to Blekinge and Småland could be controlled, as well as the transport route along the river (fig. 1).

The fortified city was built at a rapid pace. An area of 700×300 metres was created; new land was built up with landfill over meadows and marshes. Only then could streets be laid out and the first houses take shape. However, by building on a virgin site, the principles of the Renaissance ideal city could be applied. Around it, fortifications rose in the form of six-metre-high ramparts with ten bastions and two city gates.

During the last decade, archaeology has been able to change and enrich the image of Christianstad's complex and conflict-laden past. Investigations in the hinterland have shown how the medieval urban landscape was changed by the decision to build a fortress. The aim of this paper is to highlight the complexity of archaeological fieldwork in an early modern fortress town and to illustrate some appropriate methods with examples from recent excavations. And even though the contemporary sources are plentiful it is important to pay attention to the pitfalls hidden in texts and detailed military maps and drawings. Hopefully, the lessons learned in Christianstad may be useful for similar sites in Scandinavia!

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Note: All the archaeological reports listed here as references can be found at Arkivsök: https://www.raa.se/hitta-information/arkivsok/

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“Why does she act this way”? An oblique look at interdisciplinary cooperation in archaeological observation, documentation, and analysis work.

By Axel Christophersen

Introduction

The title of this paper is derived from a literary work authored by the renowned Swedish writer Astrid Lindgren (Lindgren 1981). In the novel, a subterranean creature ponders the presence of two human legs protruding from the roof of her underground dwelling. This unprecedented occurrence poses a challenge in terms of comprehension and explanation. Interactions with enigmatic and unknown phenomena are consistently thrilling yet often arduous and exacting. Equally, interdisciplinary initiatives invariably include encountering the unfamiliar: What is this? What is the rationale for the approach? How can we effectively handle interactions with other fields in multidisciplinary collaborations, both presently and in the future? This is essentially the topic of this paper. We assume that goals, objectives, desires, and aspirations drive our actions. However, the painful confrontation with facts permanently influences the outcomes of intentions, hopes, and dreams. This principle also applies to scientific activity when established research tactics and objectives are confronted with novel and appealing opportunities. This paper will explore the use of scientific methodologies in archaeological research and its impact on cross-disciplinary collaboration. Let me begin with two relatively innocuous assertions: 1) The implementation of novel methodologies serves as a primary avenue in archaeology to facilitate interdisciplinary collaboration, and 2) The successful unlocking of the knowledge potential in methodologies imported from other scientific disciplines relies on the partners' ability to effectively communicate and exchange knowledge that is of mutual interest and relevance. To ground the conversation, my main objective for this paper is to a) establish the idea of scientific collaboration through definitions and research on multidisciplinary collaboration, b) to provide a concise overview of how the introduction of new methods has improved and expanded collaborative practices in archaeology over the past few decades, c) to advocate for the inclusion of interdisciplinary collaboration routines as a mandatory component of archaeological project design, and finally d) to elucidate how this can, and will continue to, seamlessly incorporate interdisciplinarity as a fundamental component in archaeological research methodologies.

What is the necessity for interdisciplinary collaboration?

In recent years, advancements in digital archaeology, statistics, big data, and bioarchaeology have greatly expanded the potential of archaeological knowledge. This potential is now greater than ever before, surpassing even the debut of the radiocarbon dating method in the 1950s. To harness this untapped potential for the advancement of urban archaeology, it is imperative that we design a methodological plan that not only allows for its utilisation but also facilitates its further development.

Contemporary archaeological efforts have consistently involved experts from several scientific and humanistic fields, so what is the reason for my habit of knocking on doors that are already open? The crucial inquiry, however, pertains not to the mere accomplishment of the task but rather to the way it has been executed and the consequential outcomes it has yielded beyond the accumulation of increasingly extensive and precise information on a wide range of issues. The conventional response to shared experiences resulting from multidisciplinary collaboration is that science and humanities lack a common baseline in terms of their paradigms, and their understanding of essential concepts typically diverges. The abovementioned perspective presents a fundamental instrument in the interdisciplinarity field, which challenges both sides in fostering communication rooted in mutual respect and comprehension. Fischer *et al*. from the Dep. of Social Science, Education and Learning Science group, Wageningen University reviewed in 2011 eighty-one publications on natural-social collaborations (Fischer, Tobi & Roneltap 2011). Their study revealed that out of the eighty-one papers examined, seventy-two highlighted a greater number of obstacles rather than possibilities. The barriers identified are as follows: a) disparities in the epistemological paradigms employed in the relevant scientific fields, b) the proficiency and capabilities of the participating scientists, c) the institutional framework in which the research is conducted, and d) the structure and coordination of the collaborative efforts (after Tobi & Kampen 2018). From my experiences leading the project "Mediaeval Urban health-from private to public responsibility AD1000-AD1600" (Medheal 600), which the Norwegian Research Council funded, I have found that the challenges of epistemological and linguistic differences can be overcome

by establishing shared interdisciplinary research goals. However, success in interdisciplinary work requires navigating a complex and lengthy path. To achieve this primary objective, it is necessary to establish interdisciplinary communication as a cohesive and sophisticated component within the framework of urban archaeological research design. However, this principle is not limited to the collaboration in natural science alone but also extends to the contact with our neighbouring disciplines in the humanities, such as historians and other comparable specialists. There is a long-standing and troubling misconception that historical archaeology and history are so interconnected that no room exists to explore and gain from their beneficial differences. These borders should not be seen as problematic or causing scholarly disputes but rather as a starting point for using the differences to have healthy thought exchanges. Through my involvement in the MedHeal600 project, which fostered interdisciplinary collaboration between archaeologists and historians, I recognised the importance of discerning the unique characteristics of the empirical data and the methodological approaches to facilitate meaningful exchanges between the two disciplines. When the unique characteristics of different disciplines are permitted to be compared, it stimulates creativity and motivates us to collaboratively develop knowledge with the potential to bring about transformation.

The pursuit of investigating past lives is a joint research goal across various fields within the humanities. However, this focus may have inadvertently overshadowed the potential for creative exploration that arises from the distinct nature of empirical data and methods. These differences create gaps between disciplines, which can be utilised as opportunities for interdisciplinary collaboration. Keep the entrance open, expand its width and make it more welcoming!

What does "interdisciplinary research cooperation" mean?

The notion of interdisciplinary research collaboration is continually shifting due to the dynamic nature of science and the changing research practices. What is called interdisciplinarity now may be seen as disciplinarity tomorrow, as seen in the United States. According to the National Academies of Sciences, interdisciplinary research aims to advance our understanding or solve problems that a single discipline or area of research cannot address. Hilde Tobi and Jarl K. Kampen (2018: 1211-1213) define interdisciplinary research as being based on a conceptual model that integrates theoretical frameworks from different disciplines, utilises study design and methodology that is not limited to any one field and requires the perspectives and skills of multiple phases of the research process. One level below interdisciplinarity is *multidisciplinary,* a process where collaboration provides a one-way advantage, and the methodologies are seen as auxiliary science. At the highest level of the hierarchy is *transdisciplinary*, which occurs when the methods and knowledge of several disciplines are combined, and the borders between them are eliminated. Accordingly, we must inquire about this.

How is the practice of interdisciplinarity implemented in the field of urban archaeology?

To avoid exaggeration and be more direct, I would assert that urban archaeology requires a comprehensive discussion on the methodology for effectively utilising the numerous innovative opportunities presented by modern digital archaeology and advanced scientific techniques such as evolutionary genetics, stable isotope analysis, lipid analysis, and others. There is no straightforward solution to overcome this obstacle. An essential prerequisite is to augment interdisciplinary studies by acquiring information about the collaborative disciplines involved rather than only possessing knowledge of them. Nicky Priaulx and Martin Weinel discuss the concept of *connectivity knowledge* and argue: "*...for efforts to be placed in enhancing researchers' "about-Knowledge", a form of connective knowledge that extends researchers' basic knowledge about other fields prior to constructing collaborative projects*." (Priaulx & Weinel 2018: 1). It is emphasised that a basic understanding of *about-knowledge* is insufficient to initiate joint research strategies or designs. Collaborative connectivity necessitates more than practical, organisational, and communication solutions, which are naturally the focal point when joint projects are devised. Nevertheless, as collaborative endeavours advance, the necessity for a shared comprehension of the application and utilisation of diverse theoretical, methodological, and empirical resources grows increasingly urgent.

This necessitates a deeper *of-knowledge* that enables the involved parties to comprehend the more profound ramifications of difficulties arising from "*conflicting conceptualisations of 'expertise'*" in the intersection of the participating research fields (Priaulx & Weinel 2018: 2). While the limitations and quality of about-knowledge can be subject to debate, it is undeniably crucial to address and facilitate this aspect during the pre-project plan. I emphasise this point because my experience with the MedHeal600 project made me realise my limited understanding of the aDNA process. This lack of knowledge hindered my ability to establish effective collaboration routines, anticipate challenges, and critically evaluate the analysis results for synthesis purposes. What impact will this have on the existing standardised procedures of archaeological research?

Altering the established procedures of archaeological research?

The activity of archaeological research is formed by the intricate interconnection of knowledge and concepts regarding historical events, physical remnants from the past, techniques for examining, recording, and studying these remnants, and the structural framework, including organisation, legality, and administration. All these pieces are floating, coming together, breaking apart, and manifesting as new research practice complexes that we call *Processual Archaeology*, often known as *Symmetrical Archaeology*, which refers to a particular approach within the field of archaeology. We often presume that these diverse *archaeologies* approach the past with distinct paradigmatic choices, but this is an incomplete truth. The availability of new scientific methodologies is a key factor in this regard. Kristian Kristiansen has asserted that: "…*we are now in the middle of a third science revolution in archaeology*…" (2019). In addition to these groundbreaking scientific methodologies, their subsequent impact on the discipline has often stimulated research developments, the creation of novel material classifications, and the formulation of groundbreaking inquiries. What would be the impact and extent of implementing new methodologies on the established research procedures and objectives? Suppose archaeologists at an early stage can effectively acquire knowledge through an interdisciplinary collaboration programme. In that case, they can uncover untapped knowledge potential and facilitate the integration of advanced scientific methods into archaeological practice, allowing for flexible adaptation and enhanced operational effectiveness. This will permanently redirect the established practice of archaeological investigation in a new direction, often with unforeseen consequences. Norwegian archaeologists Wenche Brun and Anette Øverlid have examined the implications of implementing modern digital documenting techniques. They argue that the introduction of novel and comprehensive techniques for digital documenting creates a strong inclination to accumulate a substantial volume of data (Brun & Øverlid 2022). Consequently, they pose a thought-provoking question: to what extent do these new discoveries constitute excessive documentation? Will the utilisation of sophisticated digital tools create a greater separation between us and the objects, and if so, how will this impact the process of interpretation? While 3D and scanning techniques offer novel ways to visualise archaeological findings, it is important to assess whether their compelling nature could potentially hinder the critical interpretation process. An essential inquiry encountered during the first tumultuous period of the digital revolution is the need to promptly establish infrastructure to retrieve existing data and store new data, which the implementation of new strategies and organisational frameworks must accompany. Another challenge will be to coordinate and compare data with different qualitative characteristics. Are we well-equipped to handle these intricate encounters in the near future?

Current trends

The bioarchaeological revolution and digital and statistical tools require specific knowledge and practical experience. This will allow these new scientific methods to be more effectively and individually integrated into archaeological research practice compared to the traditional *auxiliary sciences* methods. Following these advancements, the notion of *High-Definition Archaeology* has emerged. This involves meticulously planned approaches to gather data, incorporating sophisticated techniques such as radiocarbon, dendro-dating, and statistical methods. These methods allow for a significantly more accurate correlation between time, location, and past activities. Consequently, it establishes connections between historical events,

geographical areas, and societal movements, aligning them with established theories of past occurrences and sequences of events. The Northern Emporium project, focused on Viking Age Ribe, is a remarkable illustration of this (Sindbæk 2022; 2023). The Northern Emporia project's design is challenging to replicate for standard rescue excavations due to the excavation strategy and sampling programme being highly demanding in terms of time and resources. Indeed, this statement holds true when evaluated based on the well-established principles of rescue archaeology. However, it also provides a limited preview of the intricate nature of future urban archaeological research procedures. It stimulates and provokes alternate thinking about the objectives that should determine on-site surveys and documentation tactics and the important data to collect.

Although it can be perceived as provocative, it is vital to critically examine the established practices and research strategies that urban rescue archaeology has adhered to for many years. It is time to challenge these practices and consider the immense potential for knowledge that High-Definition Archaeology can generate. It is worth noting that these practices have their roots in a time when the primary goal of urban archaeology was to uncover information about *urban topography* and related activities. However, the times are changing, and I strongly believe that one of the most important future goals in urban archaeology will be to employ techniques such as geochemical analysis, micromorphology, and ancient DNA sampling to thoroughly investigate and accurately date the daily activities, behavioural patterns, and repetitive actions in urban areas. Currently, our understanding of these aspects is limited and lacks detailed information within a specific chronological framework. High-definition aerial (HDA) imaging is already, and will continue to be, an exceptionally beneficial tool for urban archaeology in Scandinavia. Its efficacy warrants exploration, particularly when complex and extensive structures on the ground require sharpness and clarity that define its form in detail (Holden *et al.* 2002)

Conclusion

Undoubtedly, contemporary archaeological research methodologies are undergoing a vibrant and dynamic evolution. Collaboration with external disciplines and exploring new archaeological materials and research locations provide archaeology with fresh opportunities to investigate unexpected historical contexts and rejuvenate existing ones. As a result, archaeological ideas and existing knowledge will be questioned and become more intertwined with other disciplines that study past life. This will lead to the development of new research methodologies and practices. The anticipated methodological expansion will have several positive effects. Firstly, it will enhance the appeal of archaeology as a research partner. Secondly, it will lead to the adaptation and extensive utilisation of archaeological methodology in previously unexplored research domains. Lastly, the emphasis on methodological concerns, rather than theoretical ones, will contribute to advancing archaeological practices, which is particularly desirable following the period of *Archaeology after interpretation*. Archaeology will rely heavily on specialised analytical knowledge and skills. Additionally, there is a need to establish an educational programme to cultivate internal expertise, which my department, the Department of Archaeology and Cultural History, University Museum, NTNU Trondheim, Norway, already possesses. There will be an increase in rivalry for funding and support for individual research initiatives and the cultural heritage management sector as a whole. One significant obstacle urban archaeology faces is its heavy reliance on rescue excavations, often hindered by limited resources and time constraints. This poses a critical difficulty for the field. The methodological revolution will impact current project planning and on-site routine activities. The future is characterised by a multitude of unresolved issues that are difficult to foresee, and therefore, I will abstain from making further predictions that might be in vain.

Acknowledgements

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Summary

This paper examines the influence of contemporary scientific methodologies on interdisciplinary collaboration in archaeological research. In order to completely capitalise on the untapped potential for urban archaeology's advancement, it is imperative that we establish a methodological framework that not only enables its application but also fosters its ongoing development. The primary concern is not the completion of the task, but rather the manner in which it was completed and the outcomes it yielded. This is in addition to the acquisition of more precise and detailed data on a variety of subjects. In comparison to the conventional auxiliary sciences, the bioarchaeological revolution will facilitate the individual and more successful integration of these new scientific approaches into archaeological research. How will this affect the planning and execution of interdisciplinary projects, and, perhaps more importantly, how can we leverage information and experiences from cooperating partners and research domains to comprehend and apply these experiences to enhance future research questions and strategies for archaeological inquiry?

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Echoes of the past – Challenges of documenting the fortifications of Kristianstad

By Fredrik Larsson

Excavations in Kristianstad

Since 2012, Kristianstad, situated in the southern part of Sweden, in the northeastern part of Scania, has experienced an increase in contract archaeology excavations, mainly focused on the city's fortifications. The excavations of Danish and Swedish fortifications from the 17th and 18th centuries necessitated using archaeological methods different from those traditionally applied during fieldwork. Two of the main methods are ground-penetrating radar and photogrammetry. Surveying the sites through remote sensing techniques before the excavations and 3D-documenting the complex archaeological features have now become a crucial part of the workflow. These methods are highly useful, not only in a fortification context but also at other complex archaeological sites, such as an 18th-century bakery and the cemetery of the Holy Trinity Church. The excavations mentioned in this article were carried out by archaeologists at Sydsvensk Arkeologi AB. The ground-penetrating radar surveys were conducted in collaboration with the company Modern Arkeologi. To understand why these methods have become adapted and their usefulness, it is important to have a brief overview of how the archaeological methods have evolved.

The evolution of documentation methods

Documenting archaeological features by hand drawing has been the standard method for over 200 years. In a European context, probably one of the most famous early examples of this is Napoleon Bonaparte's troops and their drawings of the Egyptian pyramids and monuments. Napoleon the Third also carried out archaeological excavations in Egypt in the 1860s (Musée d'Archaéologìe Nationale). In Scandinavia, land surveyors, military personnel, engineers, and priests did much of the earliest documentation, descriptions and drawings regarding ancient sites. In the early ages of archaeological excavations, the focus was often on excavating, drawing and describing prehistoric grave mounds, medieval fortresses and churches.

A significant change in Swedish archaeology was the use of excavators in the 1960s and 1970s. This allowed the removal of topsoil on a much larger scale than before. In a historical and urban archaeology context, the archaeological fieldwork was already affected by excavating machines, at least since the 1950s (Rosborn 2016: 36). This created the need for new methods to survey and document bigger sites with larger amounts of archaeological features. In Sweden, during the 1990s and onwards, several changes to archaeological documentation practices were introduced. The introduction of the total station and digital measurements was a major breakthrough. The introduction of archaeological database software like FFD and later Intrasis also became major milestones (Huggett 2023: 12ff.).

Another significant change in the early 2000s was the adoption of digital cameras, which enabled more photos to be acquired during an excavation (Sapirstein 2020: 135f.). Another shift in archaeological documentation was the introduction of the RTK-GPS, which sped up the measuring process because of a much shorter deployment time compared to a total station. New advancements in RTK-GPS technology now allow for the measuring pole to be in a leaning position when measuring, as well as measuring and sending the data to a database in real time (Pearson 2015; Gunnarsson 2022: 44; Trimtec). Today's application of photogrammetry, laser scanning, and drones enables 3D models of whole sites to be placed in a GIS environment. This creates new possibilities for interpretations but also creates a large amount of data (Dell'Unto & Landeschi 2022: 22ff., 41, 55, 74). It is a continuing debate regarding the use of more and more digital methods in archaeology, a discussion that has been ongoing since the 1990s (Derudas 2023: 6). The pandemic in the 2020s caused a significant change in the perspective of many archaeologists regarding using digital methods (Derudas 2023: 9, 17, 31ff.). The possibility of visiting excavations and physical conferences was heavily restricted, and working remotely became much more common. Because of the pandemic, the need to share data in a digital format increased. After the pandemic, there has been increased attention paid to digital methods and the possibilities they could provide in the right context.

The necessity of more digital methods during excavations in Kristianstad became increasingly evident throughout the years. Larger and more complex excavations and more of the historical sources available digitally increased the amount of data needed to be processed and interpreted.

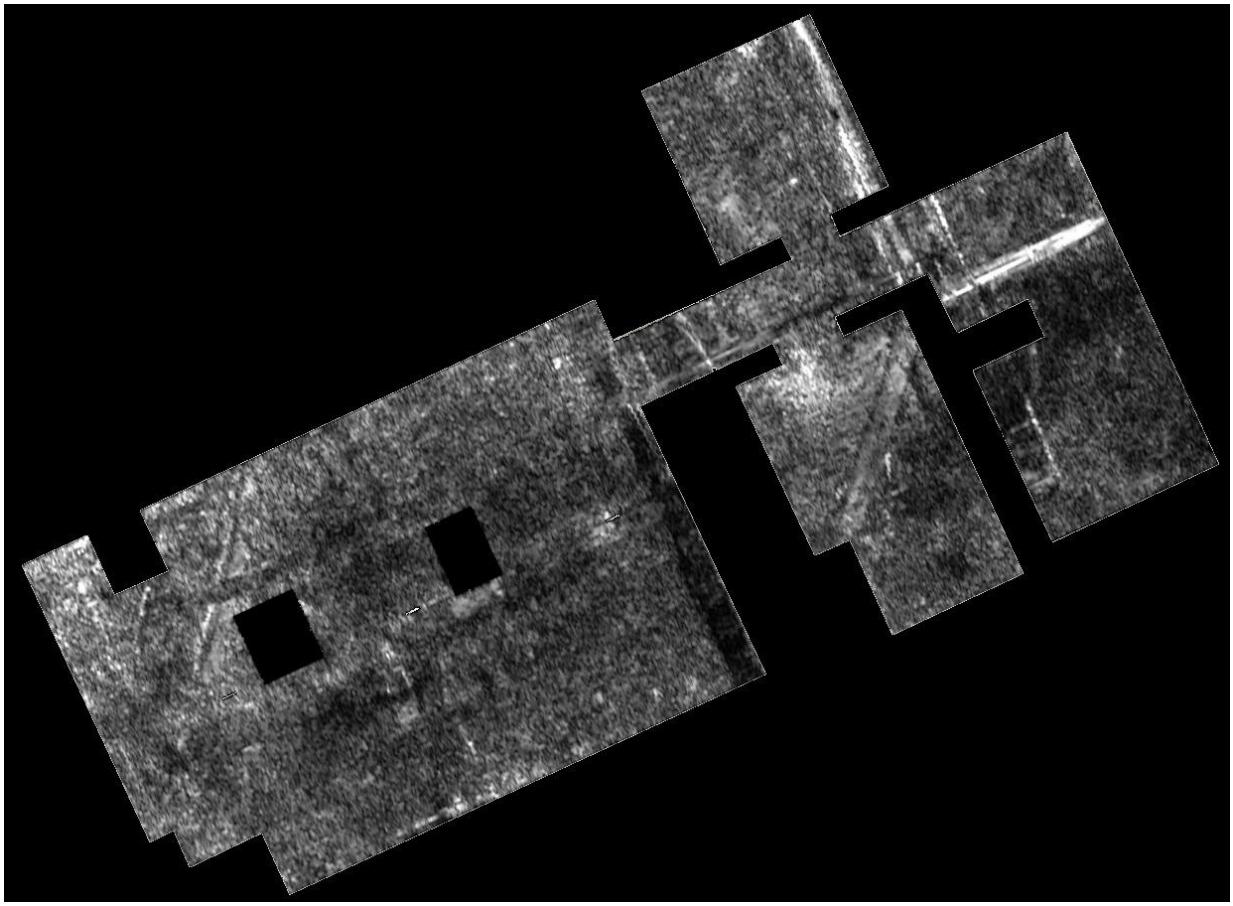

Fig. 1. One of the slices from the GPR data from the survey of The Queen's Bastion. The walls of the casemate are visible to the left. After L. Winroth & L. Wing, 2020, with some edits made by Fredrik Larsson, Sydsvensk Arkeologi.
En av dataskivorna från markradarn i samband med karteringen av Bastion Drottningen. Väggarna i kasematten är synliga till vänster.

An enormous amount of historical written sources, over 115 shelf meters of documents, and over 1,600 historical maps are available, which is an enormous amount of data (Johnson 1964: 13; Riksarkivet). The information now available digitally created the possibility of having better and more accurate background data before excavating. Surveying with a ground-penetrating radar (GPR) would be important for the excavation planning process. Results from a GPR survey allow the placement of the trenches where they can provide the highest degree of information. The data also provides information about areas outside of the trenches, which creates a better understanding of the whole site, even in the cases where the site is only partially excavated. Documenting the features in great detail during the excavations in a way that would allow several different data types to be extracted using the same acquired data post-excavation became a crucial point as well. Preferably, the methods chosen would also allow digital data-sharing with other archaeologists working on fortifications from the same periods, mainly the 17th and 18th centuries. The new methods of choice were ground-penetrating radar and photogrammetry.

GPR - more than meets the eye

Ground-penetrating radar (GPR) is a remote sensing/survey method that has become more commonly used in the last ten to fifteen years, especially in historical and urban archaeology contexts. The ground-penetrating radar sends out electromagnetic pulses at regular intervals through the machine's antennas, and the machine measures how quickly and how much of the pulses are reflected from the ground. There are two major branches of ground-penetrating radar in archaeology: the multichannel radar that is often used together with

Fig. 2. Several of the areas surveyed with the ground-penetrating radar with the interpretations presented. After L. Winroth & L. Wing, 2020, p. 51.
Flera av de karterade områdena undersökta med markradar med dess tolkningar presenterade.

an ATV or similar vehicle and the single-channel GPR that is smaller in size and is manually operated by the user (Viberg, Gustafsson & Andrén 2020: 6f., 14; Winroth & Wing 2020: 44).

The workflow with the GPR used in the present case consisted of an overview of the historical maps in the specific area and the data gathering in the field with a single-channel GPR. Following the data collection, the interpretation of GPR data and a detailed examination of historical maps were done through a collaborative approach. After this process, the interpretations of archaeological features, possible damaged areas and modern disturbances like pipes, cables, etc, were created as shapefiles in a GIS environment. The interpretations and the GPR slices allowed the project leader for the excavation to plan where the trenches should be placed. The shapefiles would be imported to an RTK-GPS and used during the excavation. The GPR data on fortification sites showed the well-preserved areas where walls, moats and embankments could be found as well as the areas where the fortifications had been completely removed or damaged by later activities and buildings (Pettersson & Winroth 2016: 23-51; Pettersson 2021: 14, 34; Pettersson, Larsson & Liahaugen 2023).

As an example, in the case of the Bastion Crown Prince Gustaf, the embankments were visible, as well as the moats in the GPR-data (Pettersson & Winroth 2020: 24f). At the Queen's Bastion, one of the bastions casemates with its inner walls were visible in the survey-data (fig. 1). The damage to the bastion caused by the construction of the city's old water towers and water reservoirs was also visible. The GPR data made it possible to place the trenches in the best possible areas to gather data about the damages caused by the water plant and locate the specific rooms in the casemate (fig. 2) (Pettersson, Larsson, & Liahaugen 2023: 35ff.).

Several of the areas that would be excavated were close to the city's railroad or what had been industrial areas. Soil samples from geotechnical drilling showed major soil pollution in some areas. Since GPR is nonintrusive, it was possible to survey a heavily polluted area. The GPR data could be acquired, even though archaeological excavation was impossible because of the pollution (Pettersson 2021: 29f.).

It is not only at fortifications GPR has been applied in Kristianstad. Another example of the importance of GPR data is from the excavation of the cemetery of the Holy Trinity Church in Kristianstad. The church was built in the 17th century, and the cemetery was used until the 1830s. The excavation would be ongoing at the same time as the remodelling of the cemetery. The archaeologists would work side by side with the construction workers. The GPR data not only showed archaeological features but could also be used to show and classify different areas of graves based on their degree of visibility in the data. The GPR data also became very important for planning the construction work for the contractor. The GPR data showed areas with archaeological features or areas without archaeological features where new pipes and cables could be placed. During the excavation process, the archaeological project manager and the construction company used the GPR data for daily and weekly planning. The large number of construction workers on a strict schedule to perform their tasks made the speed of the excavation process highly important. The whole operation required quick adaptation in planning and execution for everyone involved, and in this process, the GPR data was of great help (Larsson 2025).

Is GPR survey useful in archaeology?

The results from Kristianstad have shown several important factors to consider regarding ground-penetrating radar. The collaboration between the project participants as well as the study and rectification of the historical maps, together with the GPR data, made the interpretations incredibly useful and highly accurate (Pettersson 2021: 34). The usefulness of the GPR data is also very much related to the person acquiring the data in the field. It is crucial to have technical knowledge of the GPR and an understanding of archaeology to make sure the equipment settings are suitable for recording archaeological features (Puente et al. 2018:130). In interpreting the data, it is also essential that project members collaborate to understand the GPR data. However, there are also certain cases where GPR can be slightly less useful. If there are layers of clay, stone, bricks or other highly reflective materials on top of other archaeological features, not all features will be visible since the electromagnetic pulse will not be able to penetrate the reflective material enough to show what is deeper down in the ground. The results of a GPR survey also don't give a date for the features visible in the data. This means if a feature is visible in the data, it is not possible to know if it is modern or of archaeological interest. An excavation is needed to possibly date the feature.

GPR is highly complex, and the use of the right type of GPR, single- or multichannel, the right settings of depth slices, and lighting conditions during data interpretations are factors to consider when using GPR in an archaeological context. Some knowledge of the geological conditions of the site also helps when conducting a survey. The complexity tends to create a fairly steep learning curve for new users, both regarding the acquisition of data in the field, as well as when interpreting the data. That is also why GPR surveys, in most cases, become a collaborative effort in a team with technical, archaeological, and geological knowledge to provide the best results and data from a site. This is how Sydsvensk Arkeologi, together with Modern Arkeologi, have been working collaboratively regarding GPR surveys on the fortifications in Kristianstad, which have produced valuable results and increased the quality of the archaeological excavations.

The use of ground-penetrating radar has frequently created new insights before, during and after the archaeological fieldwork. This has also created requirements for the documentation systems to be able to handle more data, often with increased complexity as well. The excavations in Kristianstad, particularly the fortifications, often have features in three dimensions, such as walls, moats, etc. A regular 2D profile drawing or one photo does not make the feature fully justice, which creates the need for efficient 3D documentation.

Photogrammetry – documenting fortifications in 3D

The need to link archaeological features, physical attributes, and artefacts with the documentation

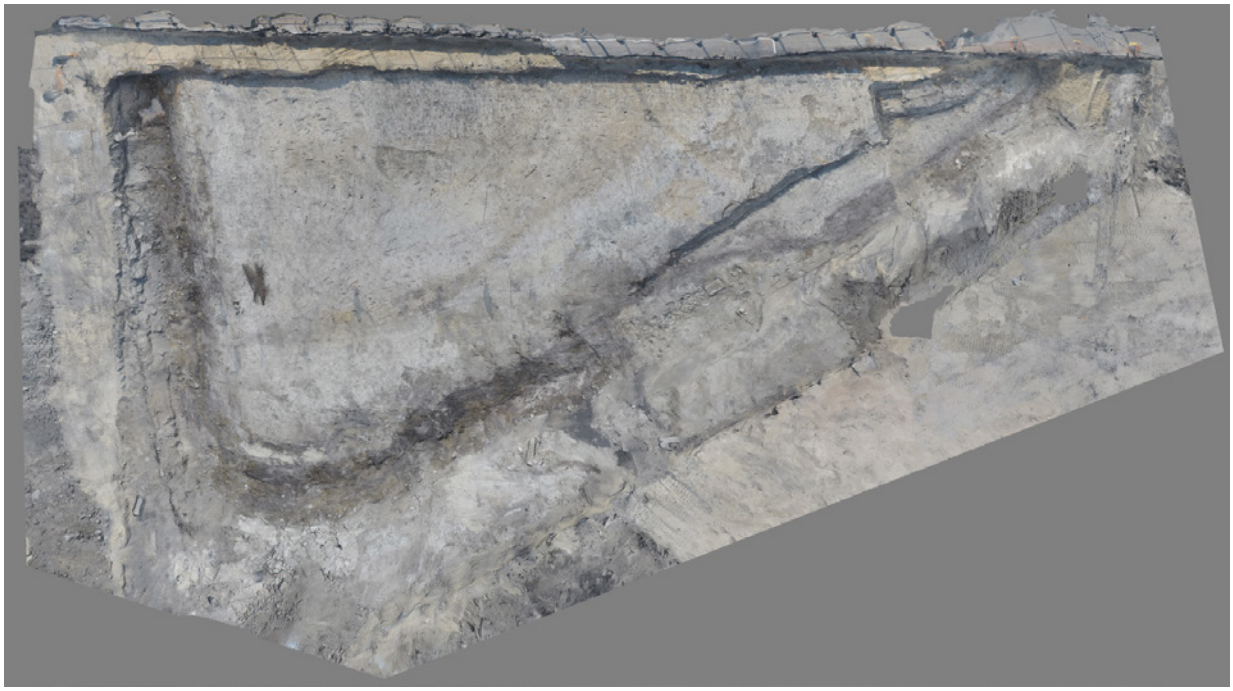

Fig. 3. The 3D model of the counterguard. After C. Pettersson & F. Larsson, 2022, p. 79.
3D-modellen av kontregarden.

and historical sources efficiently and make them searchable has encouraged the use of digital technology in archaeology. In contract archaeology, there is also, a need for speed with the documentation process during fieldwork. Fortifications are often massive structures and would require large amounts of time to be documented by hand if they were to be done in a very detailed way, and they can also be quite complex. In Kristianstad, there can also be different phases, with Danish and Swedish fortifications built on top of each other, which increases the complexity.

Photogrammetry became a method used when documenting the fortifications to speed up the documentation process in the field and allow access to the site in a digital format during the work and the report afterwards. Photogrammetry refers to image-based 3D models made through specific software. The models are created from digital photos taken from different angles and with an overlap between the photos (Sapirstein 2020).

Photogrammetry was used to document a counterguard, which made it possible to study and show the topology of the moat's edge and the counterguard's preserved level (fig. 3). The counterguard was excavated in very hot weather, making the surface dry up quickly. Thus, the differences in hues of the surface were minor during data capture, compared to how it was after the topsoil was removed (Larsson 2022: 81f.). The biggest weakness during data acquisition with a camera is usually the colour capture and the example above shows the importance of acquiring data at the right moment in the excavation process.

The Queen's Bastion was a more complex site to document (fig. 4). The bastion consisted of both Danish 17th-century and Swedish 18th-century fortifications. The foundations of embankments, as well as a large part of a casemate, were identified. The casemate had preserved brick walls of about 1.2 meters in height, some of which were slightly leaning due to the vaults in the casemate. There were also preserved floor levels and a cannon emplacement. Also, one entrance to the casemate was uncovered with cobblestone in front of the casemate, as well as parts of the door frame in stone were still in situ (Pettersson, Larsson & Liahaugen 2023).

Photogrammetry made it possible to document all the features quickly and have the features accessible at the office after the excavation was concluded. The 3D models were further studied to discuss and analyse building techniques. Analysing the historical maps and GPR data, it was possible to conclude what was built during the Danish and Swedish eras. Due to the complexity and several different trenches, a couple of thousand photos were acquired, but this allowed

Fig. 4. The entrance to the casemate. Rendering of the 3D model. After F. Larsson, 2023, p. 15.
Ingången till kasematten. Rendering av 3D-modellen.

for very high-resolution models. The use of photogrammetry created documentation of the site in exact detail, which would not have been possible with manual drawings within the time frame of the excavation. Markers were placed on the site and measured with RTK-GPS (Larsson 2023). This makes it possible to place both the current 3D models as well as future models in a GIS environment for further study. The use of 3D models in a GIS environment has been done before with very good results (Dell'Unto & Landeschi 2022:64ff.).

Other use cases of photogrammetry

Photogrammetry was also applied to other types of sites in Kristianstad, such as the previously mentioned cemetery, which had a specific focus on documenting the graves. The 3D models makes it possible for osteologists to interpret the spatial distribution of disarticulated bones and minor mechanical changes such as dry fracture patterns and more when they are doing their analysis at the office with access to high-resolution 3D models (Wilhelmson & Dell'Unto 2015:14ff.; Larsson 2025).

Another example is Kv Hovrätten, with an excavation of an 18th-century bakery. There was a bakery, several other buildings and two wells on the site, making it fairly complex to excavate. In several areas, modern trenches had damaged the archaeological features, and the cultural layers lacked physical connections. A top view of the site was needed, but using a drone was impossible due to legal restrictions (Transportstyrelsen). A GoPro camera on a pole was used to acquire photos for a 3D model. The model allowed a bird's-eye view of the whole excavation area. The model made the interpretations easier because larger areas and structures were more clearly visible in the model than from the ground view (Svensson, Pettersson & Larsson 2020:80). In this context, several models would have made it possible to "recreate" the excavation and provided additional data about the excavation process and the site's stratigraphy during the post-excavation analysis.

Using photogrammetry in Kristianstad has allowed archaeologists to document archaeological features in a high-resolution digital format that can be connected to other data types. This allows search functionality and new questions and results to be created from the data. Experiments with old photos from several years ago but with updated software and with more powerful computers than earlier show that the same original data can generate better models than before, and hence, it is important to keep the original data (Larsson 2025).

Is the future only digital?

Ground-penetrating radar and photogrammetry have become widely used methods today but are still under development. The use of AI on ground-penetrating radar data to improve the ability to analyse and interpret capabilities is possible in the future. Tests with ChatGPT 4 data image analysis and GPR data show that there is

still a long way to go before it is fully functional. ChatGPT is a language model AI and has not yet fully adapted to image analysis at the time of writing this article. Other more in-depth studies show that it is most likely possible to use AI, but it requires a big data set and training the AI with machine learning and deep learning (Küçükdemirci & Sarris 2022). However, the research is ongoing and human interpretation of the GPR data is still crucial.

The use of photogrammetry, laser scanning, drones and Lidar enables the capture of large data sets with exceptional detail. Significant initiatives regarding digital methods and their use in archaeology have started in the last few years. *Swedigarch* is a major ongoing project in Sweden that catalyses and stimulates digital methods of documentation and analysis (Swedigarch). Also, a growing interest in digital methods and research can be seen in PhD dissertations in the last few years (Gunnarsson 2022; Derudas 2023). Some of the studies have also started doing research on data standards. The ability to preserve data and different types of software in a rapidly growing field is crucial now and in the future. Without set standards of how to preserve data, a lot of it will otherwise be lost in the future when new software and data formats are created. We can already see the loss of data from the late 1990s and early 2000s when a lot of the equipment, such as total stations, GPS and GIS software were new, and there were no set standards.

This article gives a short overview of the ongoing work on ground-penetrating radar and photogrammetry in Kristianstad. So, the question is, does using ground-penetrating radar and photogrammetry replace hand drawing and other commonly used methods? The short answer is no, it does not. As with all archaeological methods, they should be used when suitable for the specific site and type of archaeological feature. The archaeologist's interpretation of features during excavation is still incredibly important and cannot be replaced with digital methods. Through our methods and work, our goal should continue to capture the echoes of the past and preserve them for future generations.

Summary

Since 2012, archaeological excavations in Kristianstad, located in southern Sweden, in the northeastern part of Scania, have experienced an increase of excavations, regarding the city's 17th and 18th century fortifications. These complex historical sites necessitated adopting advanced methods like ground-penetrating radar (GPR) and photogrammetry. These techniques enabled efficient site surveys, enhanced excavation planning and faster field recording of large and complex features. Apart from fortification sites, GPR and photogrammetry have proven effective also in other contexts, such as at the cemetery excavation of the Holy Trinity Church and an 18th century bakery site.

GPR has become an important nonintrusive survey tool before excavations. Through GPR surveys intact embankments, moats, and casemates at fortification sites such as the Queen's Bastion and Crown Prince Gustaf's Bastion have been revealed. However, GPR has limitations, including difficulty penetrating thick layers of reflective materials such as clay or other hard surface materials and its inability to date features without excavation.

Photogrammetry is now a widely used method that further enhances archaeological documentation by creating precise 3D models from overlapping digital photographs. This method is particularly effective for documenting complex structures such as fortifications, where manual drawing would be very time-consuming. Photogrammetry was used to document features such as a casemate at the Queen's Bastion, providing detailed models for post-excavation analysis. Through the 3D models archaeologists could analyze site stratigraphy and construction techniques of the casemate.

GPR and photogrammetry have been applied beyond fortifications. At Holy Trinity Church's cemetery, GPR data helped plan construction work to ensure protection of archaeological features such as graves. Similarly, at the site of an 18th century bakery, captured 3D data was used for interpretation of the bakery and other structures.

The adoption of digital methods like GPR and photogrammetry has sparked debates about their role in archaeology. Critics argue they cannot replace traditional techniques, and limitations such

as a steep learning curve and technical knowledge still pose a barrier. However, the use of GPR and photogrammetry have significantly advanced archaeological research, allowing archaeologists to document, interpret, and share data more effectively. Ongoing developments, including AI-assisted GPR analysis and standardized digital data preservation, promise further innovations. The use of GPR and photogrammetry should be used as complementary methods, when relevant, together with more traditional methods to ensure that the best possible data collection and results are achieved.

The excavations in Kristianstad exemplify how combining traditional and digital methods enhance both field work, as well as the interpretations, making it possible for archaeologists of today to preserve the echoes of the past, ensuring this knowledge is available for future generations.

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Järnet och byggnaderna. Användandet av järn i den tidigmoderna stadens byggnader och användandet av arkeologiskt järn som källmaterial. Exemplet Norrköping

Av Linda Qviström

Fig. 1. Med den tidigmoderna tidens förändringar i inredning och boende följde ett ökat användande av järn. Spik av olika slag användes till trägolv, paneler, lister och foder. Till den nya typen av kittade fönster i träkarmar behövdes hörnbeslag, om fönstren inte bara fästes med spik, samt gångjärn och haspar. Gångjärn och lås behövdes också till innerdörrar och skåp. Merparten av det järn som bör ha använts till den typ av inredning som avbildas här anar vi bara indirekt. Det vi ser är lås till dörrar och skåp. I skåpet sitter nycklarna i och på den stängda dörren syns en nyckelbricka. ”Das Frühstück in di Posthause aus Carlsbade: Minsann ett muntert sällskap”. Fredrik Boije (1773–1857). UUB alvin-record:370522. Public Domain Mark
With the changes in interior design and daily life during the early modern period, there was an increased use of iron. Nails of various kinds were used for wooden floors, panels, and casings. Corner fittings, hinges, and bolts were often needed for the new type of glazed windows in wooden frames. Hinges and locks were also required for interior doors and cabinets. The majority of the iron that would have been used for the type of furnishings depicted here is only indirectly represented in the drawing. What we see are mainly locks for doors and cabinets.

Inledning och utgångspunkter

Under tidigmodern tid skedde stora förändringar i såväl produktionen som konsumtionen av järn. Produktionen ökade och stångjärnsframställningen förenklade tillverkningen i nästa led. Detta gällde inte minst byggnadsjärn. Ingenjören Bo Molander har pekat på den ökade användningen i inre konstruktionsdetaljer, i form av dragjärn och järn i exempelvis spiskåpor. Här användes modifierade stångjärn, som kapades och klövs (Molander 1985). Den mer storskaliga tillverkningen av spik ökade också och skedde både vid bruken och i mindre smedjor (se t.ex. Nilsson 1985). Under samma period skedde även stora förändringar i boendet och husbyggandet. Antalet rum blev fler och med detta ökade även antalet dörrar och fönster, som nu hade blivit en självklar del av rummen på ett annat sätt än tidigare. Fler våningar blev vanligare och andelen snickerier ökade, inte minst i städerna, i form av möbler och inredning som socklar, foder, panel, invändiga trappor och innertak. Till många av de tidigmoderna inredningsdetaljerna användes järn – som spik, beslag, gångjärn och lås (jfr fig. 1). Stora mängder spik gick också åt till läkt under tegeltak eller då byggnader försågs med utvändig panel. På ett övergripande plan går det att konstatera att användningen av järn ökade både i byggnadernas

stomme och fasad och med den växande mängden inredning.

Det är troligt att det här medförde ändrade praktiker kring användandet av järn och även en ändrad syn på järnet som byggnadsmaterial. Samspelet mellan förändrade boendeformer och ökad järnanvändning är dock relativt outforskat. Att konsumtionen är undersökt i betydligt mindre grad än produktionen gäller inte heller bara det järn som använts i byggnader (jfr Karlsson 2015a, 2015b).

För att kunna diskutera detta samspel mellan bruket av järn och ändrade byggande- och boendepraktiker – vilket är den övergripande målsättningen här – krävs det till en början mer forskning kring det faktiska användandet i byggnader och hur detta ändrades under perioden.

Den kunskap som finns idag baseras i hög grad på dokumentation av detaljer i bevarade byggnader. Detta ger användbara exempel men knappast någon helhetsbild av järnanvändandet. I den litteratur där materialet presenteras – ofta i handböcker och liknande, tillkomna i byggnadsvårdssammanhang – är repertoaren förhållandevis begränsad (t.ex. Rosén 1967 och Hidemark 1973, båda har utkommit i flera senare upplagor). Ofta är det samma exempel som återkommer och enklare järndetaljer som spik finns i regel inte alls med. Mycket av det järn som använts är också dolt och kan i stort sett enbart dokumenteras i samband med rivningar eller ombyggnader. Bo Molander (1968; 1985) kunde genomföra sina tidigare nämnda studier på grund av efterkrigstidens omfattande rivningar av äldre bebyggelse. En annan användbar publikation som tillkommit under tragiska omständigheter är smeden Mattias Heljes genomgång av spik från den nedbrunna Södra Råda kyrka i Värmland. Här har åtta spiktyper, utöver maskintillverkad spik som klippspik och trådspik, kunnat urskiljas och knytas till olika byggnadsfaser och användningsområden (Helje 2016).

Från Nordamerika finns exempel på detaljerade studier som lett till typologier som kan användas som hjälp vid datering av byggnader (t.ex. Wells 1998; Adams 2002). För nordeuropeisk del är Chris Hows forskning betydelsefull i detta sammanhang. I avhandlingen från 2022 undersöker han universella aspekter av hur spik använts historiskt samt möjligheten att använda materialet daterande. How har även publicerat artiklar tillsammans med arkeologer och byggnadsforskare från bland annat Frankrike och Lettland (t.ex. How et al. 2016). I vilken utsträckning dessa paralleller är användbara även för svenskt material – annat än på principiell nivå – återstår dock att utvärdera.

Ett material som sannolikt i högre grad skulle kunna användas för att belysa järnanvändandet i tidigmoderna byggnader, inte minst i städer, är det arkeologiska. Det har utförts en rad undersökningar av tidigmodern stadsbebyggelse under senare år. Fynd av järn som använts i byggnader, inte minst spik, är vanliga vid dessa och potentiellt kan fynden bidra med konkreta exempel på hur järnkonsumtionen har förändrats över tid. Med de arkeologiska materialen skulle det troligen också vara möjligt att komplettera de exempel på föremål som finns i byggnadsvårdslitteraturen med fler varianter och dessutom bidra med nya dateringar. Genom arkeologiska undersökningar går det vidare sannolikt att fånga in andra och fler miljöer än vad som representeras i materialen från stående byggnader. Det finns dessutom möjligheter att här kunna studera dolda och mer vardagliga föremål än vad som vanligen uppmärksammats vid byggnadsinventeringar. Ökad kunskap om byggnadsjärnet skulle i sin tur också kunna bidra till att detta i högre grad än idag kunde aktiveras vid tolkningen av de arkeologiska lämningarna (jfr Qviström *et al*. 2023). Kanske kan exempelvis spikar eller beslag knytas till olika typer av fasader eller specifika inredningsdetaljer? Materialet används sällan för denna typ av analyser, även om undantag finns (se t.ex. Welinder 1992).

Möjligheten att använda arkeologiska fynd för att diskutera järnanvändandet i byggnader har inte tidigare utvärderats i någon högre grad (jfr Qviström *et al*. 2023). I den här artikeln görs ett försök till en sådan utvärdering. Här undersöks material publicerat i 18 rapporter från arkeologiska undersökningar i Norrköping. Samtliga är exploateringsundersökningar, där tidigmoderna lämningar har berörts. Den första genomfördes 1997–1998 och var den dittills mest omfattande i staden. Den senaste utfördes 2019 (fig. 2 och tab. 1). Den fråga artikeln söker svar på är om materialet från dessa undersökningar kan användas för att besvara frågor om järnanvändandet i tidigmoderna byggnader.

Diskussionen om forskningspotentialen hos fynd från arkeologiska exploateringsundersökning-

gar är intressant även på ett mer generellt plan. Vilken användbarhet har materialen för forskare som ställer andra frågor än de som finns med i rapporter och undersökningsplaner?

Vad är det då som krävs för att materialet – de arkeologiska fynden av byggnadsjärn – från undersökningarna skall vara användbart i detta sammanhang? Vilka problem finns? Till att börja med kan det, framför allt i urbana miljöer, vara svårt att säkert knyta föremålen till enskilda byggnadslämningar. Det är också troligt att delar av järnet har återanvänts i senare hus eller som råmaterial, och att föremålen därför antingen saknas bland fynden eller förekommer i yngre lager. Även där det inte går att få en upplösning av materialet på byggnadsnivå är det dock möjligt att göra mer övergripande jämförelser, exempelvis mellan tomter och byggnadsfaser. Och återanvändningen är visserligen ett källkritiskt problem, men samtidigt också en intressant fråga i sig. Hur länge har järndetaljerna varit i bruk? Vilka järnföremål är det som har tillvaratagits och återanvänts och vilka har lämnats kvar?

Det största problemet med det arkeologiska fyndmaterialet är ofta inte knutet till den tid då husen byggdes, brukades och övergavs och då de kulturlager vi undersöker bildades, utan istället till vår egen tids hanterande av dem. Det handlar om hur fynden samlas in, dokumenteras och bevaras, samt om hur denna process redovisas. En av de grundläggande förutsättningarna för att det arkeologiska materialet ska kunna användas är att fynden dokumenterats på ett sätt som gör det möjligt att i efterhand bedöma vilken typ av föremål som hittats var. Särskilt om fynden inte bevaras efter avslutad undersökning behövs även andra uppgifter, om föremålens egenskaper. Enbart övergripande bestämningar som ”spik” eller ”beslag” är i många fall inte tillräckliga för att kunna föra en diskussion om vad materialet representerar. Inte minst för att kunna göra kvantitativa jämförelser behöver det också gå att avgöra om urval har gjorts i olika led och i så fall hur. De parametrar som undersöks här är därför:

- Insamling. I vilken utsträckning har järnföremålen samlats in vid undersökningarna? Vilka insamlingskriterier har använts?
- Konservering/bevarande. Hur stor andel av järnföremålen har konserverats? Vad har gallrats? Vilka urvalskriterier har tillämpats?
- Registrering och dokumentation. Hur har fynden redovisats och registrerats? Vilka uppgifter tas med?

I Sverige finns generella riktlinjer för omhändertagande av arkeologiska fyndmaterial, utarbetade av Riksantikvarieämbetet (Fysiskt omhändertagande av arkeologiskt fyndmaterial 2011). Hur insamling och omhändertagande sker vid den enskilda undersökningen styrs av undersökningsplanen, vilken godkänns av länsstyrelsen, den instans som fattar beslut om arkeologiska undersökningar (Fysiskt omhändertagande av arkeologiskt fyndmaterial 2011; Uppdragsarkeologi 2021). Det som undersöks i den här artikeln är dock inte regelverket kring fyndinsamling och dokumentation, utan praktiken såsom den avspeglas i undersökningsrapporterna.

Arkeologiska undersökningar i Norrköping

Gemensamt för de arkeologiska undersökningar som ingår i studien är att de berört tidigmoderna stadslämningar. Vid flera av dem har även äldre, huvudsakligen medeltida, lämningar undersökts. De spår som finns efter medeltidens Norrköping är förhållandevis få och spridda, trots att det finns flera indikationer på att platsen haft en central betydelse under denna tidsperiod. Två medeltida kyrkor och ett kapell är kända och under senare år har flera fragment av tidigkristna gravmonument hittats samt en gravgård från vikingatid/tidig medeltid. Ur kommunikationshänseende har placeringen vid Strömmen varit central. Vattendraget har nyttjats för kvarnar och fisken och senare för tidiga industrier. Vid många av de arkeologiska undersökningar som gjorts i staden har också spår efter olika typer av metallhantverk påträffats, både från medeltid och tidigmodern tid (Ljung 1965: 58–69; Helmfrid 1965: 169 ff., 369 ff.; Broberg 1984: 6–8; Lindgren Hertz 2001; Tagesson 2020: 103; Carelli 2021).

Under 1500-talet gynnade kronan aktivt järnhanteringen i Östergötland. Finspång blev centrum för produktionen och Norrköping utskeppningshamn. Det här ledde till att staden växte kraftigt, särskilt under senare delen av 1500-talet och första halvan av 1600-talet. Norrköping kom att bli landets näst största stad, med internationella kontaktnät och en betydande hantverkarkår. På Holmen i Strömmen anlades en rad industrier, un-

der ledning av Louis de Geer (Helmfrid 1965: 291; Carelli 2021: 359 ff., 368 ff., 384 f., 740 ff.). I början av 1600-talet gjorde Hertig Johan Norrköping till residensstad och påbörjade 1613 uppförandet av slottet Johannisborg. I anslutning till detta anlades stadsdelen Nya Staden, som ett led i att göra Norrköping mer ståndsmässigt. Här erbjöds förmånliga villkor för den som byggde stenhus eller tvåvåningshus i trä eller korsvirke (Helmfrid 1965: 42–48; Carelli 2021: 468 ff., 738 ff.).

En rad välbärgade personer uppförde hus i Nya Staden under 1600-talet. Mest påkostat var Louis De Geers palats, Stenhuset (Carelli 2021: 301 ff.). Långt ifrån alla bodde dock i lika storslagna gårdar. Skillnaderna i social status mellan olika stadsdelar under den här tiden är något som avspeglas såväl vid de arkeologiska undersökningarna som i de skriftliga källorna (jfr Helmfrid 1965: 290–292).

Stadens snabba expansion under 1600-talet framträder tydligt i arkeologiska materialen. Söder om Strömmen, i kvarteret Dalkarlen, har bebyggelsen från den här tide i hög grad hört till Holmens bruk, inte minst till mässingsbruket där en grupp tyskspråkiga personer var anställda. Under 1640-talet kom området därför att kallas Tyskebacken. Vid de två slutundersökningar som genomförts här har en medeltida väg konstaterats, parallellt med Strömmen. Däremot hade ingen bebyggelse etablerats i området förrän under 1500-talet och 1600-talets början (Hållans Stenholm, Karlsson & Tagesson 1999; Lindeberg 2015). Även vid en undersökning i S:t Persgatan öster om samma kvarter konstaterades att stadsbebyggelsen etablerats vid denna tid. Huvuddelen av de undersökta byggnadslämningarna hörde till första halvan av 1600-talet (Wirbrand 2020).

Även norr om Strömmen, i kvarteren Täppan, Mjölnaren och Laxen, har lämningar efter 1600-talets bebyggelseetablering framkommit (Nielsen 2003a; 2003b; Bertheau 2013; Jonsson 2015). I kvarteret Mjölnaren fanns dessutom tidigmedeltida lämningar. Sådana har också konstaterats öster om Strömmen, i kvarteren Gamla Rådstugan och Tullhuset. I övrigt märks även i det här området en etablering av stadsbebyggelse under 1600-talet (Jonsson 2015; Bertheau 2018; Klange 2018). Detsamma gäller i kvarteret Ruddammen, längre österut längs Strömmen (Carlsson & Runer 2012). I kvarteret Tullhuset är den äldsta bebyggelsen något senare. Den kan dateras till tiden efter 1660-talets stadsreglering (Klange 2018). Även längre från Strömmen, i kvarteret Skeppet, hör de undersökta bebyggelselämningarna till senare delen av 1600-talet (Hedvall 2017).

Den yta som undersökts i kvarteret Klockan i södra delen av staden har utgjort en obebyggd del av en större stadstomt under tidigmodern tid, använd för odling (Sköld 2015). Också i kvarteret Spinnrocken i stadens södra utkant fanns lämningar efter odling, men även efter trähusbebyggelse, huvudsakligen med dateringar till 1700-tal (Jonsson 2014).

Fyra av de aktuella undersökningarna gjordes i Nya Staden, eller Saltängen, norr om Strömmen. Louis De Geers palats Stenhuset hade börjat byggas här 1627 men förstördes i en brand som drabbade området 1711. Vid den undersökning som gjordes 2009 i kvarteret berördes inte själva palatsbyggnaden, däremot den tillhörande trädgården (Dardel 2011). I grannkvarteret Gubben undersöktes en ekonomidel hörande till palatset 2011. Här framkom också lämningar efter den bebyggelse som tillkommit på tomten efter 1711 års brand (Carlsson 2014). Även i kvarteret Spinnhuset, direkt väster om Stenhuset, har arkeologiska undersökningar genomförts. Här hade tomten bebyggts efter 1635 (Lindeberg 2021). I kvarteret Mässingen i samma del av staden har lämningar efter både bostadshus och verkstäder undersökts. Den äldsta bebyggelsen daterades till 1610-talet (Feldt & Nordman 2016).

Undersökningarnas syften och frågeställningar

De arkeologiska undersökningarna har generellt syftat till att öka kunskapen om bebyggelseutveckling och markutnyttjande över tid. I ungefär hälften av rapporterna finns också formuleringar som mer specifikt berör byggnader och byggnadssskick. Inte minst gäller detta undersökningarna i Nya Staden.

I kvarteret Spinnhuset var frågeformuleringarna uppdelade på två teman. Under det ena ”*I skuggan av palatset – vilka människor bodde här i utkanten av staden under 1600-talet?*” ställs specifika frågor kring husen – kring vilken typ av bebyggelse som funnits, hur husen sett ut och vilken funktion de haft (Lindeberg 2021: 17).

Från den undersökta delen av kvarteret Gubben finns brandsyneprotokoll från 1769 och 1783 med detaljerade beskrivningar av den handelsgård

Fig. 2. Karta över Norrköping upprättad efter rysshärjningarna 1719, med läget för de kvarter där de arkeologiska undersökningarna utförs markerat (jfr tab. 1). 1. Dalkarlen, 2. Gamla Rådstugan, 3. Gubben, 4. Klockan, 5. Konstantinopel, 6. Laxen, 7. Mjölnaren, 8. Mässingen, 9. Ruddammen, 10. S:t Persgatan, 11. Skeppet, 12. Spinnhuset, 13. Spinnrocken, 14. Stenhuset, 15. Tullhuset, 16. Täppan. Karta: Lantmäteriet, Lantmäteristyrelsens arkiv D75-1:9.

Norrköping after 1719, when the Russians had set fire to the city in an attack. On the map, archaeological sites mentioned in the text are numbered (cf tab.1): 1. Dalkarlen, 2. Gamla Rådstugan, 3. Gubben, 4. Klockan, 5. Konstantinopel, 6. Laxen, 7. Mjölnaren, 8. Mässingen, 9. Ruddammen, 10. S:t Persgatan, 11. Skeppet, 12. Spinnhuset, 13. Spinnrocken, 14. Stenhuset, 15. Tullhuset, 16. Täppan.

Nr, fig. 2	Kvarter/gata	Unders. år	Unders. yta (m2)	Föremålsfynd, ant.	Järnföremål, ant.	Järnföremål, andel	Referens
1	Dalkarlen	1997–1998	312	8688	1046	12%	Hållans, Karlsson & Tagesson 1999
1	Dalkarlen*	2013	330	357	75	21%	Lindeberg 2015
2	Gamla Rådstugan*	2015	Ca 800	860	189	22%	Bertheau 2018
2	Gamla Rådstugan*	2017	132	181	27	15%	Låås 2018
3	Gubben*	2011	Ca 1700	2456	382	16%	Carlsson 2014
4	Klockan	2014	246	218	19	9%	Sköld 2015
5	Konstantinopel	1999–2000	320	1345	513	38%	Karlsson, Menander & Heimdahl 2006
6	Laxen*	2011	330	919	129	14%	Bertheau 2013
7	Mjölnaren**	2012	2 900	347	67	19%	Jonsson 2015
8	Mässingen	2014	1783	2099	207	10%	Feldt & Nordman 2016
9	Ruddammen*	2010	750	978	112	11%	Carlsson & Runer 2012
10	S:t Persgatan	2018–2019	759	2 606	72***	3%	Wirbrand 2020
11	Skeppet	2013	550	274	7	3%	Hedvall 2017
12	Spinnhuset*	2014 2016	2550 1630	1066	309	29%	Lindeberg 2021
13	Spinnrocken	2011	3 300	1694	177	10%	Jonsson 2014
14	Stenhuset*	2009	1720	1066	308	29%	Dardel 2011
15	Tullhuset*	2015	682 (FU 268 (SU))	193	24	12%	Klange 2018
16	Täppan	1997	290	103	8	8%	Nielsen 2003b

* Antalet fynd anges inte i rapporten och fynden har inte registrerats med löpnummer. Uppgifterna är ungefärliga sammanräkningar utifrån rapportens fyndtabeller.
** Antalet och andelen järnfynd är beräknade efter fyndtabellen och ungefärliga.
*** Vid undersökningen används det övergripande begreppet ”metall”.

Tab. 1. Arkeologiska undersökningar i Norrköping (jfr fig. 2). För föremålsfynd och järnföremål anges antal fyndposter som redovisas i rapporten. Rapporten från Tullhuset omfattar både för- och slutundersökning (särskild arkeologisk undersökning).

som legat här. Frågeställningarna som rörde de tidigmoderna byggnaderna på tomten formulerades med hänsyn till detta:

Vi visste också hur byggnaderna såg ut – antal våningar och rum, liksom takbeklädnad, typ av golv, antal fönster, spisar, kakelugnar etc som fanns. Detta gav oss möjligheter att i samband med undersökningen skapa viktiga arkeologiska referensmaterial för vidare tolkning av materiell kultur under främst 1700-talet. Hur ser exempelvis de arkeologiska lämningar ut efter de byggnader som vi genom skriftligt material vet funnits på platsen? Fanns det några specifika konstruktionsdetaljer som kan knytas till vissa typer av byggnader och som i framtiden kan underlätta tolkningen av byggnader där samma underlagsmaterial inte finns tillgängligt? (Carlsson 2014: 18)

Rapportförfattarna påpekar efter undersökningen att denna inte gav så många fynd från husens inredning. I fyndförteckningen finns dock ett stort antal spikar och även gångjärn och beslag noterade (Carlsson 2014: 238).

I samband med undersökningarna i kvarteret Mässingen är det både bebyggelse i vidare mening och byggnader (konstruktion, datering, inbördes relation och funktion) som nämns i frågeställningarna (Feldt & Nordman 2016).

Vid undersökningarna inom de äldre delarna av staden har oftare bebyggelseutvecklingen i ett längre tidsperspektiv varit i fokus och i flera fall är det de äldre lämningarna som har prioriterats. Även vid dessa undersökningar ställs dock i regel också frågor kring den tidigmoderna bebyggelsen. Vid 2015 års undersökning i kvarteret Gamla Rådstugan är den första frågan som ställs:

Först och främst: hur har tomtytorna strukturerats rumsligt? Hur ser lämningarna efter gårdarnas bebyggelse ut? Vad rör det sig om för byggnader? Har bostadsbebyggelsen legat här eller är det andra typer av hus, t.ex ekonomibyggnader som kan komma att påträffas? (Bertheau 2018: 17)

Vid undersökningen i kvarteret Mjölnaren prioriterades gravar och övriga medeltida lämningar, medan de förhistoriska som konstaterats på platsen och de tidigmoderna skulle ges lägre prioritet. I den av frågeställningarna som berör bebyggelselämningar kommer dock även ett par av frågekomplexen specifikt in på tidigmoderna byggnader (Jonsson 2015: 18, 21 f.).

I kvarteret Laxen rör den övergripande frågeställningen tidigmodern tid: ”sociala nivå och konsumtionsstrategi under 1600- och 1700-talet.” Till de analysparametrar som lyfts fram hör ”byggnadsskicket, gårdsgestaltningen och bordskulturen”. Bland annat ställs frågan om det finns några specifika konstruktionsdetaljer som kan knytas till vissa typer av byggnader (Bertheau 2013: 11).

I S:t Persgatan var de två huvudsakliga målsättningarna att förstå framkomna ”byggnads- och gatulämningar” och att öka kunskapen om Norrköpings historia. De äldsta lämningarna gavs högst prioritet (Wirbrand 2020: 11).

Fyndinsamling, konservering/ bevarande och fyndredovisning

Fyndinsamling

Järnföremål har samlats in vid alla de berörda undersökningarna (tab. 1). Författarna av rapporten från 1997–1998 års undersökning i kvarteret Dalkarlen anmärker att fyndsammansättningen härifrån i stort överensstämmer med den generella bilden av efterreformatoriska material från städer. Huvuddelen av fynden, 74%, utgjordes av keramik. De näst största materialkategorierna var järn och glas som svarade för 12% respektive 7%. Sett till fördelningen av olika föremålstyper utgjorde kategorin spik 3% medan oidentifierade järnföremål svarade för 7% av antalet föremål (Hållans Stenholm, Karlsson & Tagesson 1999: 29).

Kommentaren om att fyndmaterialet kan ses som representativt görs utan någon konkret hänvisning till andra material. En jämförelse med de övriga undersökningarna i Norrköping visar snarare att antalet järnfynd och den andel dessa utgör varierar relativt mycket. Flest fynd har registrerats från kvarteret Konstantinopel där järnföremålen också utgjorde störst andel av den totala mängden fynd. Även i kvarteren Spinnhuset och Stenhuset utgör järnfynden en stor andel – närmare en tredjedel. Lägst antal järnfynd finns från kvarteret Skeppet. Både här och från undersökningarna i S:t Persgatan är andelen bara 3% (tab. 1).

Skillnaderna beror sannolikt på olikheter dels i lämningarna, dels i undersökningsmetoder och prioriteringar. Den stora andelen järnfynd från kvarteret Konstantinopel kan till exempel delvis ses mot bakgrund av att dessa varit relativt sett

mer prioriterade här och i högre grad registrerats individuellt. I kvarteren Spinnhuset och Stenhuset är en möjlig förklaring istället att mer järn använts i de påkostade byggnader som funnits i området. Den låga andelen järnfynd i S:t Persgatan avspeglar troligen till viss del att lämningarna inte innehöll material från tiden efter 1600-talets slut, men möjligen även att gallring skett innan fynden registrerades och att föremålen i högre grad registrerats i klump (se nedan). Vid kvarteret Skeppet är det troligt att spik inte regelmässigt samlats in eftersom det endast finns fyra fyndposter spik härifrån.

För att kunna avgöra vad skillnaderna mellan materialen beror på och exempelvis jämföra hur fynden fördelar sig över tid krävs med andra ord att vi vet hur insamling och eventuella urval har skett. Informationen är dock ofta bristfällig på den här punkten. I flera av rapporterna redovisas att vissa typer av lager har undersökts extensivt, vilket sannolikt har medfört att en lägre andel fynd insamlats härifrån. Vilka lager detta gäller är dock i regel inte specificerat. Detsamma gäller de undersökningar där kronologiska prioriteringar anges, något som rimligen också har påverkat fyndinsamlingen. Bara i tre rapporter – från kvarteren Laxen och Mässingen samt från S:t Persgatan, redovisas någon uttalad fyndinsamlingsstrategi (tab. 2). Vid undersökningen i kvarteret Laxen anges att samtliga fynd och ben som framkom tillvaratogs. Det enda undantaget var tegel, vars förekomst endast noterades (Bertheau 2013). Vid undersökningen i kvarteret Mässingen anges att det var föremål som bedömdes vara från tiden före 1850 som tillvaratogs, med tyngdpunkt på föremål från 1600- och 1700-talen. Metallfynden samlades huvudsakligen in i sin helhet. Senare kommenteras dock att endast ett urval av spikarna togs tillvara. Vilka urvalsprinciper som användes anges inte. Det gjordes även ett urval såväl i fält som i samband med fyndregistreringen av fynden från utfyllnadslager (Feldt & Nordman 2016: 27, 78). Vid undersökningen i S:t Persgatan uppges att alla fynd samlades in och registrerades, som kunde knytas till stratigrafiskt säkra kontexter. Ett undantag gjordes för tegel och kakel, som bara insamlades där det fanns dekor som bedömdes som möjlig att datera (Wirbrand 2020: 13 f., 92). Det är dock troligt att ytterligare urval skett innan fynden registrerades. I minst ett lager (1722) beskrivs en stor mängd metallföremål ha hittats, utan att dessa återfinns i fyndlistan.

För en fjärde undersökning, i kvarteret Gamla Rådstugan, finns en vagare formulering om att de fynd som påträffades tillvaratogs och registrerades, vilket indikerar att samtliga föremålsfynd samlades in (Låås 2018: 12). För undersökningen i kvarteret Dalkarlen 1997–1998 går det att indirekt utläsa hur insamlingen skedde. I beskrivningen av hur kontexterna skulle registreras anges nämligen att innehåll som tegel eller bränd lera som inte tillvaratogs skulle beskrivas på blanketten (Hållans Stenholm, Karlsson & Tagesson 1999: 13). Detta gör det troligt att det även skulle ha framgått av beskrivningarna om järnföremål inte samlats in.

I flertalet av de rapporter där insamlingsstrategier inte redovisas kommenteras fyndinsamlingen inte alls.

Konservering och bevarande

Även när det gäller det fortsatta urvalet i fyndhanteringsprocessen finns det generellt få uppgifter i rapporterna. I sin förstudie kring gallring av metallföremål från arkeologiska undersökningar påpekar Lena Holmquist och Antje Wendt att gallring ofta sker i tre steg: i fält innan fynden registrerats, inför konserveringen och därefter inför inlämningen av fyndmaterialet till det mottagande museet (Holmquist & Wendt 2019). Det sista av dessa steg kan äga rum efter att rapportarbetet avslutats. I flera av de aktuella rapporterna framgår av fyndtabellen att gallring gjorts senast under rapportarbetet, men utifrån vilka principer detta har skett redovisas generellt inte.

Bland de undersökningar där gallringen redovisas i fyndtabellen finns den i kvarteret Spinnhuset. Föremål av sten, som eldslagningsflinta, delar av kritpipsmaterialet samt en del glaskärl har sparats medan alla metallföremål har gallrats. För det keramiska materialet anges inte vad som sparats eller inte. Urvalet motiveras inte och inget material uppges vara konserverat från undersökningen (Lindeberg 2021). Situationen är likartad vid flera av undersökningarna.

I rapporten från kvarteret Mässingen redovisas tydligt att gallring skett i flera steg och att ”*Ytterligare selektion av metallfynden skedde inför urvalet av fynd som konserverades*” (Feldt & Nordman 2016: 27). Däremot anges inte heller här hur urvalet gjordes. Sammanlagt 66 föremål

Undersökning	Insamling/urval av metallfynd. Redovisade strategier.	Konservering. Redovisade urvalsprinciper.	Konservering. Ant. konserverade metallföremål.	Konservering. Ant. konserverade järnföremål.	Byggnadsjärn som konserverats.	Referens
Dalkarlen 1997/98	-	-	60	26	Gångjärnsbeslag, gångjärnsstapel till dörr, en möjlig spik.	Hållans, Karlsson & Tagesson 1999; ATA dnr 421-1361-1998
Dalkarlen 2013	-	-	-	-		Lindeberg 2015
Gamla Rådstugan 2015	-	-	4	3		Bertheau 2018a
Gamla Rådstugan 2017	-	-	-	-		Låås 2018
Gubben	-	-	-	-		Carlsson 2014
Klockan	-	-	-	-		Sköld 2015
Konstantinopel	-	x	27	23 (30)*	Tre hänglås, tre spikar, ett beslag, en nubb, en nyckel, en gångjärnsstapel.	Karlsson, Menander & Heimdahl 2006; ATA dnr 414-702-2002
Laxen	x	-	2	-		Bertheau 2013
Mjölnaren	-	-	22	17	Hake, möjligen till klinklås.	Jonsson 2015
Mässingen	x	-	59	30	Två beslag, fyra spikar, en krampa samt troliga delar av lås: låsfjäder och del av låshus. Två nycklar.	Feldt & Nordman 2016
Ruddammen	-	-	2	0		Carlsson & Runer 2012
S:t Persgatan	x	x	6	-		Wirbrand 2020
Skeppet	-	-	4	1	Nyckelskylt.	Hedvall 2017, se fig. 3
Spinnhuset	-	-	-	-		Lindeberg 2021
Spinnrocken	-	-	30	5	Möjligt fönsterbeslag samt hake, möjligen till klinklås.	Jonsson 2014
Stenhuset	-	-	-	-		Dardel 2011
Tullhuset	-	-	-	-		Klange 2018
Täppan	-	-	-	-		Nielsen 2003b

Källa: Huvudsakligen undersökningsrapporter. Referenser i tabellen.
*23 fyndposter järn omfattande totalt 30 föremål

Tab. 2. Rapporternas redovisning av fyndinsamlingsstrategi för järnfynd, strategi för urval inför konservering samt antalet konserverade metallföremål per undersökning.

Fig. 3. Fnr 75 från kvarteret Skeppet, efter konservering. Nyckelskylten har daterats till 1600-tal. Vid undersökningen berördes en byggnad som uppförts tidigast 1669 och som hade drabbats av en brand under tidigt 1700-tal. Foto: Lovisa Dahl, Historiska museet, Lunds Universitet. Efter Hedvall 2017.
Key plate dated to the 17th century from the site Skeppet in Norrköping (fnr/find number 75), post conservation. During the archaeological investigation where the key sign was found, a building constructed after 1669 was excavated. It had suffered from a fire in the early 18th century..

konserverades från undersökningen. Av dessa var 30 av järn.

Bara vid två av undersökningarna redovisas hur urvalet inför konservering har gjorts. Den ena av dessa är den i S:t Persgatan. Här skulle fynd som kunde vara daterande, som mynt, samt föremål från stratigrafiskt säkerställda kontexter prioriteras. Inget av järnföremålen valdes ut för konservering (Wirbrand 2020: 13 f., 92). Den andra är undersökningen i kvarteret Konstantinopel. I rapporten berör författarna den intressekonflikt som uppstått med anledning av att konservering under 1990-talet övergick från att ha bekostats av museerna till att bli något som skulle rymmas inom de enskilda arkeologiska projektens budget. Detta fick till följd att nya prioriteringar behövde göras. Författarna menar att dessa följt två olika huvudprinciper. Antingen utvaldes föremål av ”museala, utställningsmässiga” skäl, eller så prioriterades fynd som utan konservering inte var möjliga att identifiera (Karlsson, Menander & Heimdahl 2006: 33). Vid den här undersökningen valdes den senare linjen. Till att börja med röntgades 157 föremål, vilket gjorde att många fler kunde identifieras än tidigare. Av de fynd som inte heller efter röntgen kunde bestämmas valdes ett tjugotal ut för konservering (Karlsson, Menander & Heimdahl 2006: 33). I slutändan kom 23 fyndposter järn, omfattande 30 föremål, att konserveras. Två tredjedelar av dessa kunde identifieras efter konserveringen. Tre befanns vara hänglås, lika många var spikar respektive knivar. Bland fynden fanns vidare beslag, nubb, slaghuvud, nyckel, smälta, hästsko, gångjärnsstapel, sax, vekesax, länk, skära, samt ett eventuellt kors (ATA dnr 414-1416-2002).

Sammantaget är det alltså bara vid enstaka undersökningar det redovisas vilka urvalsprinciper som gällt för gallring och konservering. Det är totalt sett också mycket få av järnföremålen som har sparats. Metallföremål har konserverats från nio av undersökningarna, järnföremål från sju. Bara från fyra undersökningar har fler än fem järnföremål konserverats. Ett fåtal av de konserverade järnföremålen kan karaktäriseras som byggnadsjärn (se tab. 2).

Redovisning och registrering

Hur fyndmaterialen redovisas påverkar möjligheterna att i efterhand få en överblick över materialet och kunna ställa nya frågor till det. Fyndlistor eller tabeller finns i alla rapporter men innehållet i dessa varierar. Det varierar också hur fyndmaterialet används i undersökningsrapporterna. I ett fåtal av dessa förekommer separata fyndavsnitt. I övrigt redovisas fynden oftast som en del av undersökningsresultatet i stort. Att fynden omnämns i samband med de kontexter de är påträffade i ger en bra överblick över fyndsammanhanget. Det gör också att fynden aktiveras i tolkningarna. Däremot försvårar detta sätt att presentera fyndmaterialet överblicken över detta som helhet. Det är exempelvis i ett flertal av rapporterna svårt att utläsa hur många fynd som sammantaget påträffats och hur de fördelar sig per fas och material. Särskilt svårt är detta där fynden inte har numrerats löpande i fyndförteckningen.

Det varierar även hur utförliga uppgifterna är i respektive fyndtabell. I många fall finns inga beskrivningar alls av järnföremålen, utöver den grundläggande bestämningen (t.ex. spik, beslag). I vissa fall, som kvarteret Konstantinopel, anges visserligen även del (exempelvis del av hammare, huvud), samt typ (exempelvis typ av nyckel, vridlås) samt vikt, men inga mer utförliga beskrivningar eller måttuppgifter finns för järnfynden.

Undersökning	Keramik	Kritpipor	Metallurgisk analys, antal föremål av cu-leg	Metallurgisk analys, antal föremål av järn	Referens
Dalkarlen 1997/98	x	-	5	-	Hållans, Karlsson & Tagesson 1999; ATA dnr 321-662-2001
Dalkarlen 2013	x	x	-	-	Lindeberg 2015
Gamla Rådstugan 2015	x	x	-	-	Bertheau 2018
Gamla Rådstugan 2017	x	-	-	1	Låås 2018
Gubben	x	x	-	-	Carlsson 2014
Klockan	x	x	-	-	Sköld 2015
Konstantinopel	x	-	-	-	Karlsson, Menander & Heimdahl 2006
Laxen	x	x	-	-	Bertheau 2013
Mjölnaren 2012	x	x			Jonsson 2015
Mässingen*	x	x	-	-	Feldt & Nordman 2016
Ruddammen	x	x	-	-	Carlsson & Runer 2012
S:t Persgatan	x	-	-	-	Wirbrand 2020
Skeppet	x	x	-	-	Hedvall 2017
Spinnhuset	x	x	-	-	Lindeberg 2021
Spinnrocken	x	x	-	-	Jonsson 2014
Stenhuset	x	x	-	-	Dardel 2011
Tullhuset	x	x	-	-	Klange 2018
Täppan	-	-	-	-	Nielsen 2003b

Källa: Undersökningsrapporter, referenser i tabellen.
*Metallurgisk analys utfördes av ett 40-tal slaggfynd. Även mur- och putsbruksanalys har utförts.

Tab. 3. Specialregistrering/fyndanalys som redovisas i undersökningsrapporterna.

Beskrivningar och måttangivelser, utöver vikten, finns endast undantagsvis även i de övriga rapporterna. För en jämförelse över tid eller mellan olika undersökningar kan uppgifterna om vikt vara användbara, under förutsättning att det är känt hur insamling och gallring skett. För de enskilda föremålen säger dock vikten inte så mycket, särskilt som fynden ofta vägts tillsammans med sin korrosionskrusta och i vissa fall dessutom i grupp.

Från några undersökningar, exempelvis de i kvarteren Spinnhuset och Gamla Rådstugan, finns dock beskrivningar av flera föremål, och i vissa fall anges även måttuppgifter. Från 2015 års undersökning i kvarteret Gamla Rådstugan går det exempelvis att utläsa hur många spikar av samma längd som återfinns i en och samma kontext (Bertheau 2018).

I rapporten från undersökningen i kvarteret

Spinnrocken finns ett separat fyndavsnitt, där en god översikt över materialet ges. I fyndlistan från nämnda undersökning anges att järnfynden till största delen bestod av ”*spikar och andra mindre föremål som bultar, tenar, plattor och band, mindre beslag, märlor och krokar.*” (Jonsson 2014: 46). I fyndlistan beskrivs dock järnföremålen generellt inte närmare. Bland de identifierade föremålen räknas i fyndavsnittet ett dörrbeslag upp, som enligt fyndlistan hade tre fastsittande spikar. Inte heller detta ges dock någon närmare beskrivning. De föremål som inte konserverats anges vara gallrade (Jonsson 2014: 45–47, bilaga 2).

Även från undersökningen i kvarteret Ruddammen redovisas fynden i ett separat avsnitt, här med tematisk indelning. Under rubriken ”*Byggnadsdetaljer och inredning*” kommenterar rapportförfattarna att det är anmärkningsvärt få byggnadsdetaljer som påträffats, med tanke på att tomten varit bebyggd under 200 år (Carlsson & Runer 2012). Troligen, menar de, beror det på att allt som gått att återanvända har återanvänts. Bland de fynd som trots allt har påträffats finns tegel, fönsterglas, blyspröjs och kakel men även järnföremål och bland annat ett trähandtag, möjligen till en dörr. Under rubriken ”*Gångjärn och beslag*” beskrivs ett gångjärn, troligen till en dörr, med ”*dekorativt bladformade detaljer och en avslutande spiralvriden ögla*” (Carlsson & Runer 2012: 93). Beslaget avbildas i okonserverat skick och det är svårt att bilda sig en uppfattning om det utifrån den bild och beskrivning som finns. Föremålet hör inte till dem som har sparats. Även ett enklare bandformigt beslag antas ha hört till en dörr och ett L-format beslag till ett fönster. En möjlig gångjärnstapp hittades också (Carlsson & Runer 2012: 93). Av fyndlistan i samma rapport framgår att fler beslag påträffats, liksom lås och åtskilliga spikar. Dessa beskrivs inte närmare.

I undersökningsrapporten från S:t Persgatan redovisas fynden i ett kort separat avsnitt, som ger en summarisk överblick över materialet. Järnföremålen nämns i en mening, där det konstateras att dessa till största delen utgjordes av ”*spik och föremål som inte kunde identifieras*” (Wirbrand 2020: 92). Fyndtabellen från undersökningen gör det möjligt att avgöra var järnföremål har hittats och exempelvis knyta dem till olika byggnadslämningar, däremot finns få beskrivningar av eller kommentarer kring själva föremålen. Utöver vikten anges generellt inga mått. Fynden klumpas också i flera fall ihop under rubriken ”*Föremål*” trots att det framgår av anmärkningskolumnen att det rört sig om delvis identifierade objekt, som spikar och knivar. Vid samma undersökning används beteckningen *metall* för alla metallfynd som inte är av kopparlegering. Sannolikt var huvuddelen, kanske alla, av dessa av järn. Dessvärre går detta inte att bekräfta i efterhand eftersom materialet inte finns bevarat (Wirbrand 2020).

Användningen av beteckningen *metall* vid registreringen av fynden från S:t Persgatan är inte till någon hjälp för den som vill bearbeta materialet vidare, däremot sätter den fingret på problemet med att enbart okulärt avgöra metallers sammansättning. Det här är också, som nyss nämnts, ett exempel på information som inte kommer att gå att komma åt i efterhand, om föremålen inte bevaras. Hur stor andel av järnföremålen från undersökningarna i Norrköping var exempelvis av stål? Var sammansättningen enhetlig? Skilde den sig åt mellan olika faser eller föremålskategorier? Hur påverkades kvalitén av närheten till bruken?

Det fyndmaterial som specialregistrerats och som mest flitigt används i undersökningsrapporterna är keramiken. Även kritpiporna har regelmässigt specialregistrerats (se tab. 3). Metallfynden har däremot generellt ägnats lite utrymme i rapporterna och bara från två av undersökningarna har enstaka metallföremål analyserats närmare. Från kvarteret Gamla Rådstugan har en smälta från en klockgjutningsgrop genomgått arkeometallurgisk analys (Bertheau 2018). Från 1997–1998 års undersökning i kvarteret Dalkarlen analyserades fem möjliga ämnesjärn från en smedja daterad till 1600-talets första hälft. Syftet här var att undersöka vilka metallkvaliteter som bearbetats i smedjan och att genom detta få en första inblick i funktion och produktionsinriktning. Av de fem fynd som analyserades befanns alla vara ämnesjärn eller troliga ämnesjärn. Fyra av föremålen hade dessförinnan, vid fyndregistreringen, bedömts som slagg (Larsson 1999).

Materialets användbarhet

De senaste årtiondenas undersökningar i Norrköping har lett till en avsevärd ökning av mängden arkeologiskt material från staden. På flera områden har de också lett till ny kunskap, förmedlad inte minst genom en lång rad undersökningsrapporter. Men har de även lett till material som är

Fig. 4. Fnr 1926 från kvarteret Mässingen, efter konservering. Spiken är hittad i ett resterna efter ett golv från 1600-talets början. Den har rostat av vid ca 6 cm, vilket möjligen visar på golvets tjocklek. Foto Max Jahrehorn, Oxider AB. Efter Feldt & Nordman 2016. *A nail (fnr/find number 1926) from the site Mässingen, post conservation. The nail was found in the remains of a wooden floor from the early 17th century. The thickness of the floorboard is indicated by the preserved length of the nail, about 6 cm.*

användbara för forskning kring andra frågor än de som lyfts fram vid rapportarbetet? Kan materialet användas för att besvara frågor kring järnanvändande i tidigmoderna byggnader?

Byggnadsjärn, eller för den delen järnfynd generellt, har inte pekats ut som en prioriterad fyndgrupp vid någon av undersökningarna. Ett undantag kan möjligen sägas vara undersökningen i kvarteret Konstantinopel, där röntgen systematiskt använts för att bestämma järnföremål och där urvalet inför konservering visar på en stor medvetenhet om problemen med att en betydande andel av järnfynden i regel förblir oidentifierade vid arkeologiska undersökningar.

I två av rapporterna, från kvarteren Mässingen och Ruddammen, lyfts kategorin byggnadsmaterial fram i korta avsnitt. Här berörs även järnet. Från kvarteret Mässingen finns också det enda exemplet på spik som konserverats, där både dateringen och funktionen är känd. Spiken har använts i ett golv i hus 206, daterat till 1600-talets första hälft (fig. 4).

Även om fynden av byggnadsjärn inte lyfts fram i någon högre grad i rapporterna förekommer det återkommande att de används vid tolkningar av byggnadslämningar. Fynden inkluderas också regelmässigt i beskrivningarna av dessa. I andra fall är det möjligt att knyta vissa av järnföremålen till byggnader genom rapportens fyndförteckning. Frågan är då om det också går att använda materialet i efterhand, för att besvara nya frågor?

Enligt de uppgifter som finns i undersökningsrapporterna har strax under 3% av järnföremålen konserverats (jfr tab. 1 och 2). Huvuddelen av de konserverade fynden kommer från fyra av de sammanlagt 18 undersökningarna. Från tio undersökningar redovisas inga konserverade järnfynd alls. I de fall där gallring uppges i fyndtabellerna är det tydligt att järnföremålen generellt har valts bort redan under rapportarbetet. Det här gör att vi i efterhand är hänvisade till att använda den dokumentation av fynden som finns rapporten för att göra nya tolkningar eller besvara andra frågor än de som ställts där.

Den genomgång som gjorts av rapporterna visar dock att uppgifterna om föremålsfynden ofta är högst begränsade. De är i regel inte tillräckliga för att det ska gå att göra en ny bedömning eller utvärdera den som gjorts i rapporten. En grundläggande bestämning finns ofta, men sällan någon beskrivning, även om undantag finns. Benämningar som beslag och spik säger inte särskilt mycket om föremålens egenskaper om de inte utvecklas vidare och specificeras. Vikten, den uppgift som oftast anges, ger en fingervisning om storleken, men inte mer än så. Det kan också påpekas att den vikt som anges för okonserverade föremål inkluderar rostkrustan som bildats runt föremålet. I denna ingår ofta material från det lager föremålet legat i, exempelvis grus. Ett annat problem är andelen fynd som förblir obestämda. Användandet av röntgen för att identifiera fler järnföremål vid undersökningen i kvarteret Konstantinopel visar på fördelen med denna metod. Efter röntgen kunde en rad föremål bestämmas och ytterligare föremål kunde identifieras efter konservering. Även den metallurgiska analysen av föremål från kvarteret Dalkarlen medförde att fler av dessa kunde identifieras. Här visade sig flera fynd som först registrerats som slagg i själva verket vara ämnesjärn.

Vilka fyndmaterial som prioriteras är delvis beroende av de syften och frågeställningar som

styrt undersökningen. Frågor kring byggnader och byggnadsskick förekommer dock i ungefär hälften av rapporternas frågeställningar, utan att detta nämnvärt tycks ha påverkat prioriteringarna av hur byggnadsjärn, och byggnadsmaterial i stort, hanterats. Det kan också tyckas anmärkningsvärt att metallerna i så liten grad prioriterats med tanke på att dessa varit en så viktig del av Norrköpings tidigmoderna historia. I början av 1600-talet var staden en betydande huvudort för järnsmidet i landet (Helmfrid 1965: 164) och det är metallerna som i hög grad ligger till grund för den höga standard som avspeglas i det material som återkommande prioriterats, nämligen keramiken.

Att keramiken är det som oftast analyserats är motiverat eftersom detta i regel är den största fyndkategorin och eftersom analyserna resulterar i dateringar och dessutom är ett värdefullt källmaterial för tolkningar av hushållens konsumtion, sociala status, kontaktnät etc. Även den näst vanligaste fyndkategorin att specialregistreras, kritpiporna, ger dateringar och värdefulla bidrag till tolkningarna. Att dessa analyser återkommande gjorts skapar ett värdefullt material som dessutom möjliggör jämförelser mellan undersökningarna.

En nackdel med att det återkommande är samma material som väljs ut för specialanalys är dock att andra material lika konsekvent väljs bort och inte i samma utsträckning används i rapporterna. De redovisas inte heller på samma detaljeringsnivå. Möjligheterna att i efterhand ställa frågor till dessa material är därför betydligt mindre. Detta gäller i synnerhet järnet, som till skillnad från keramiken regelmässigt gallrats. Ingen kommer i efterhand att kunna komplettera beskrivningen eller avgöra vad de järnföremål som beskrivs som *föremål* i fyndtabellen i själva verket representerade. Det finns inte heller någon möjlighet att i efterhand försöka urskilja olika typer av spikar och beslag, än mindre att utföra metallurgiska analyser.

Inledningsvis berördes en rad frågor kring byggnadsjärn, som arkeologiska fynd potentiellt skulle kunna bidra till att besvara. Materialet från Norrköping har visat sig endast i liten utsträckning vara användbart i detta sammanhang. För att kunna besvara frågorna kring användandet av järn i byggnader hade en mer detaljerad redovisning av insamlingsförfarandet krävts men också att mer av materialet antingen hade bevarats eller dokumenterats mer riktat och systematiskt innan gallring, och att en större andel av föremålen kunnat identifieras. För andra frågeställningar, som exempelvis gällt metallernas egenskaper, hade det varit en fördel om även icke konserverat material bevarats. I sin förstudie kring gallring av metallföremål från arkeologiska undersökningar pekar Lena Holmquist och Antje Wendt på en annan viktig aspekt, nämligen behovet av bättre uppföljning från länsstyrelserna i dessa frågor (Holmquist & Wendt 2019). Det räcker inte med att principer för tillvaratagande och prioriteringar anges i en undersökningsplan. För att materialet ska vara användbart i efterhand måste det också redovisas hur dessa *de facto* tillämpats.

För att kunna göra mer precisa beskrivningar och bestämningar skulle röntgen behöva användas i högre grad. Troligen skulle även andra metoder kunna testas och utvecklas. Bättre kunskapsunderlag och referensmaterial behövs också. Det finns enstaka exempel på publikationer där till exempel olika typer av spikar presenteras på ett sätt som är användbart vid bestämningar av arkeologiska fyndmaterial (t.ex. Helje 2016; How 2017; 2022) men fler skulle behövas.

Med en mer heltäckande och precis registrering av materialet skulle fler frågor kring byggnadsskickets förändring och användningen av järn i byggnaderna kunna ställas. Skulle vi, genom att titta på mängden och sammansättningen i spikmaterialet, till exempel kunna se när olika förändringar skett i bostäderna – som det ökande antalet snickerier? Skulle det vara möjligt att spåra panelarkitekturen genom det arkeologiska materialet?

Det är tydligt att det krävs en förnyad diskussion kring vad vi tillvaratar och varför och hur vi kan göra materialet från exploateringsundersökningar mer användbart för fortsatt forskning. Det går visserligen inte att förutse vilka frågor framtida forskare kommer att ställa, men det behöver finnas en medvetenhet om och en beredskap för *att* andra frågor kommer att ställas. Även där inget material i slutänden bevaras läggs mycket resurser på att samla in, hantera och registrera tidigmoderna järnföremål. Med en större medvetenhet kring dessa frågor kan de här resurserna användas bättre.

Tack

Artikeln är skriven inom ramen för projektet *HASP–hus och sociala praktiker i svenska städer 1600–1850*, som finansieras av Vetenskapsrådet. Till den här delen av projektet har även Jernkontorets fonder för bergshistorisk forskning bidragit ekonomiskt. Tack till Göran Tagesson för synpunkter och hjälp med bland annat fyndlistor.

Summary

Building with iron. The use of iron in early modern buildings and the use of metal finds as a source material. The example of Norrköping

In the Early Modern period, a number of changes took place both in the production and consumption of iron (and steel). Production increased, prices were generally getting lower, and the making of bar iron made the secondary manufacturing of metal objects easier. In Early Modern buildings an increasing use of iron, and also a shifting role of the material, is noticeable. The growth and alteration in its use correlated not only with a changing iron production but also with contemporary changes in dwelling culture, building traditions and building techniques.

Although much research has been devoted to different aspects of production and trade, the consumption of iron is still, in many cases, understudied. The use of iron in Early Modern buildings in Sweden, or in fact in buildings from any historical period, is a case in point. An important source material in this context can be found in artefacts from archaeological excavations.

Urban rescue archaeology results in thousands of finds of nails, fittings and other types of building material. To be able to utilize these finds in research, they have to be preserved or documented in a way that provides detailed information about the objects.

This article asks if the material from eighteen rescue excavations in Norrköping in Sweden can be used to answer questions about the use of iron in early modern buildings, but finds that this is only the case to a very limited extent. Metal finds related to buildings have not been prioritized and are rarely used in interpretations. The finds are generally not documented in a way that makes the material useful for research, and hardly any of it is preserved.

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Swedigarch, Swedish National Infrastructure for Digital Archaeology, möter urban historisk arkeologi.

Av Eva Svensson and Helena Hulth

Varför behövs en arkeologisk forskningsinfrastruktur?

IT-tjänsten Zoom glödde under ett stort antal tidiga mornar och sena kvällar när en grupp forskare från olika svenska universitet och kulturarvsinstitutioner producerade en ansökan om att bygga en nationell, digital, arkeologisk forskningsinfrastruktur (Swedigarch). Bakom väckarklockor som ringde 5 på mornarna stod en önskan hos de inblandade forskarna om att kunna använda, och för andra tillgängliggöra, en massa spännande arkeologisk data som produceras i Sverige – men som inte alltid är så lätt att hitta. Zoom-glöden bar frukt, och 2021 beviljade det svenska Vetenskapsrådet medel till utvecklandet av Swedigarch för åren 2022-2027 (dnr 2021-00161).

Svensk arkeologi gick under några år från att vara en starkt centraliserad verksamhet, där staten och ett antal muséer dominerade den uppdragsarkeologiska scenen, till att bli en avreglerad affärsverksamhet med många olika aktörer (Nelson 2023). Parallellt med avregleringen ägde ett annat betydande skifte rum; arkeologin digitaliserades i rask takt, och flera olika digitala system för att dokumentera och hantera arkeologiska data såg dagens ljus i svensk arkeologi. Detta innebär att även om rapporter produceras för de arkeologiska undersökningarna är inte datan öppet tillgänglig för den som inte har tillgång till de aktuella systemen. Alltså en fråga om makt och kontroll, och ett förhållande som går emot direktiven om att data ska vara öppet tillgängliga.

Behovet av öppna, för alla tillgängliga, arkeologiska data är centralt för Swedigarch, och en av infrastrukturens främsta raison d'etre. Men frågan om makt och kontroll av arkeologiska data har också diskuterats rörande infrastrukturer. Med rätta har det påpekats att infrastrukturer är ett (annat) sätt att kontrollera och på ett dominerande sätt standardisera arkeologiska data, och infrastrukturers roll inom arkeologisk forskning och utbildning har debatterats (till exempel i Current Swedish Archaeology: Benardou 2023; Dell'Unto 2023; Huggett 2023a och 2023b; Huvila 2023; Petersson 2023; Stobiecka 2023; Taylor 2023). För svensk del har standardiserade beskrivningar tillämpats i olika sammanhang under lång tid, inte minst vid de fornminnesinventeringar som ligger till grund för det svenska fornminnesregistret (KMR).

Swedigarch har inte makten, eller önskan, att standardisera svensk arkeologi, även om de olika aktörerna inom konsortiet Swedigarch kan tillämpa standarder inom sina respektive områden. Men Swedigarch är inte EN ny app eller EN webbportal som ska samla in alla arkeologers data på ett ställe och stöpa om datan i en form. Fokus för Swedigarch är att utveckla, länka och tillgängliggöra befintlig information och existerande databaser som är producerade av många olika aktörer och institutioner verksamma inom svensk arkeologi och andra relevanta fält. Swedigarch är alltså en distribuerad infrastruktur och en nyckelresurs för FAIR-ifiering av svensk arkeologi (se nedan).

Swedigarch ska med andra ord ses som en möjlighet som svarar mot flera identifierade behov inom svensk arkeologi. Målet är att all den för svensk arkeologi viktiga data som samlas in, och tidigare har samlats in, ska tillgängliggöras för alla arkeologer, och naturligtvis även för forskare inom andra fält, på ett enkelt sökbart sätt.

Swedigarch – struktur och organisation

Ett 20-tal enheter från parterna Uppsala universitet (medelsförvaltare), Göteborgs universitet, Karlstads universitet, Lunds universitet, Riksantikvarieämbetet, Statens historiska museer, Stockholms universitet och Umeå universitet ingår i Swedigarch-konsortiet. Organisatoriskt är Swedigarch uppdelat i sex moduler. Projektledning och samordning ligger i modul 1. Riksantikvarieämbetets vidareutveckling av K-Samsök ingår i Modul 2 som hanterar forskningsperspektivet i arbetet med länkning och tillgängliggörande av kulturarvsdata från svenska muséer och minnesinstitutioner samt Riksantikvarieämbetet. Modul 3 harmoniserar och tillgängliggör digital utgrävningsdata samt utvecklar tekniska lösningar för export av geodata till öppna format (AGES). Länkning och tillgängliggörande av resultat från naturvetenskapliga analyser såsom 14C, osteologi, pollen, makrofossil, spektroskopi och aDNA samordnas i Modul 4, främst via databasen SEAD. Modul 5 tar fram handledningar och riktlinjer för användning av och återanvändning av resultaten från olika dokumentationsmetoder inom arkeologi, såsom drönar- och flygfotografi och LIDAR, samt 3D. Genom DARK Lab och Dynamic Collections utvecklar man även metoder för digitala analyser av utgrävningar, byggnader och föremål.

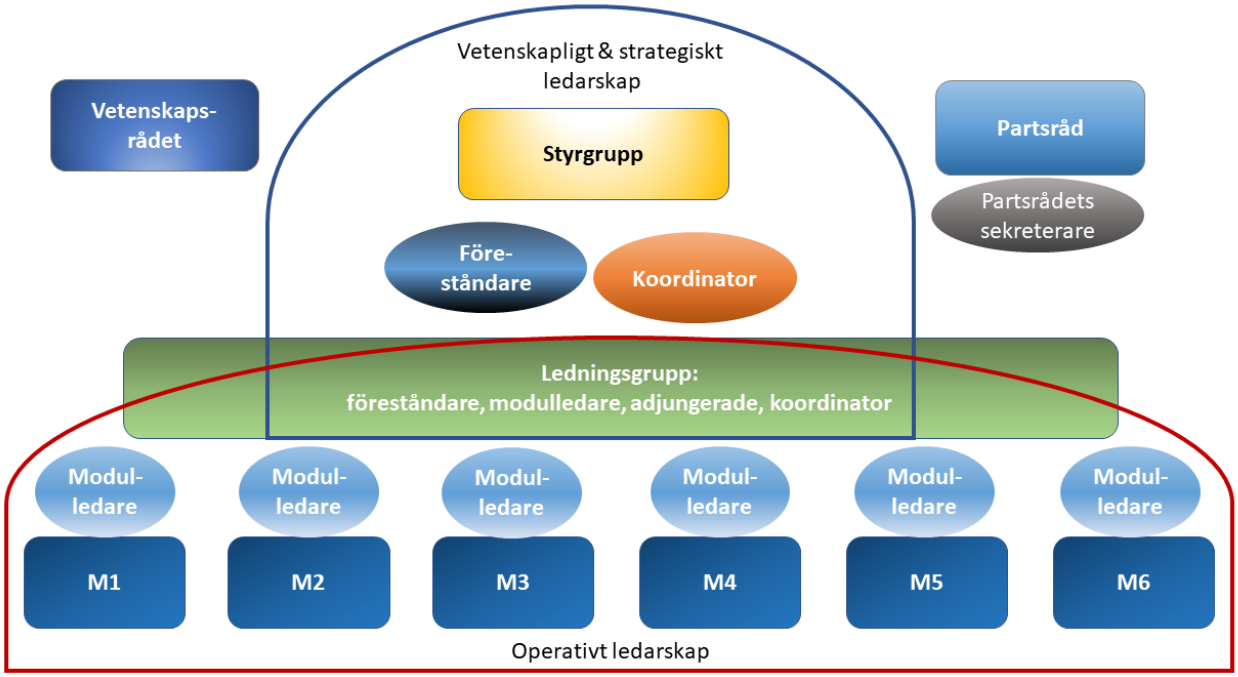

Fig. 1. Swedigarchs organisation. Figur: Helena Hulth. *Swedigarch's organisation.*

Modul 6 ansvarar för att Swedigarch ska implementeras i svensk arkeologi, och därmed utveckla forskare och forskning. Det högsta beslutande organet i Swedigarch är styrgruppen, bemannad av personer med god inblick i såväl forskningsinfrastrukturer som i svensk arkeologi. Därtill finns ett partsråd med representanter från samtliga medverkande parter.

Mot en FAIR arkeologi

Under åren har mycket intressant och viktig arkeologi producerats, framför allt inom uppdragsarkeologin men också inom olika forskningsprojekt. (Åter)användandet av all denna kunskap och data är dock inte lika omfattande – inte ens om resultaten har rapporterats och publicerats. Arkeologiska rapporter är ofta PDF-filer publicerade på utförarnas hemsidor, och många gånger med titlar som syftar på uppdraget och inte på de arkeologiska fynden. Med andra ord; datan är utspridd, och inte enkelt sökbar. I praktiken är fortfarande tips från kollegor en av de viktigaste sökvägarna för att hitta den data man letar efter. Detta ska ändras! För även om det är trevligt och utvecklande att hålla kontakt med kollegor ska möjligheterna att hitta den information man behöver vara likvärdiga för alla. I maj 2023 beslutade Sverige och EU om att uppmana till nationella strategier och riktlinjer för öppen vetenskap enligt de internationella FAIR-principerna. FAIR (Findable, Accesible, Interoperable, Reusable) innebär att forskningsdata ska vara sökbara, tillgängliga, interoperabla (tillgängliga i allmänt översättningsbara format) och möjliga att återanvända. För arkeologi är detta en särskild utmaning; dels produceras merparten forskningsdata i Sverige av olika (konkurrerande) aktörer inom uppdragsarkeologin, dels har arkeologiska undersökningar idag som regel stora tvärvetenskapliga inslag. Den data man söker finns alltså utspridd i olika repositorier, och i olika digitala format. När det gäller äldre undersökningar är datan som regel inte digitalt tillgänglig alls.

K-samsök är hjärtat i Modul 2 som drivs av Riksantikvarieämbetet med bidrag av Historiska Muséet. K-samsök samlar och tillgängliggör data i öppna format från olika kulturarvsinstitutioner. Det är öppet för alla svenska institutioner med en digitaliserad samling att ansluta sig till K-samsök, och här kan man hitta information om artefakter, konstverk, manuskript, filmer osv. En för arkeologer viktig del är Fornminnesregistret, som också är kopplat till K-samsök. För närvarande bygger man om K-samsök för att bättre kunna möta framtidens behov av tillgängliga digitala data.

Alla arkeologer är delaktiga i en forskningsprocess
Det är viktigt att poängtera att det inte bara är den arkeologiska dataproduktionen som är utspridd på flera händer. Det gäller även användandet av arkeologiska data. Riktlinjerna för FAIR beskriver forskningsdata, men inom arkeologi är forskningsdata inte något som är exklusivt för universiteten. I detta avseende skiljer sig arkeologi från många andra fält, och därför måste också en arkeologisk forskningsinfrastruktur beakta att arkeologisk forskning och kunskapsproduktion äger rum inom uppdragsarkeologi, på muséer och myndigheter och i andra sammanhang utanför universiteten.

Inom Swedigarch betonar vi att alla arkeologer är delaktiga i forskningsprocessen. En god digital arkeologisk infrastruktur ska bidra till att höja ambitionsnivån och öka kunskapsproduktionen i alla led och sammanhang inom akademin, myndigheter, muséer och inom uppdragsarkeologin – även när man står i strilande regn på en schaktövervakning. I förlängningen är Swedigarchs ambition att en gemensam infrastruktur också ska bidra till stärkta relationer, dialog och ökat kunskapsutbyte mellan branschens olika aktörer.

Öppen vetenskap innebär dock inte bara möjligheter att fritt konsumera information, utan ställer också krav på att alla arkeologiska aktörer ska lagra och tillgängliggöra ”sina” data i öppna format. Även om datahanteringsplaner blir allt vanligare är utmaningarna stora för svensk arkeologi och dess många olika aktörer. Mängden data som samlas in är enorm, men hur ska den lagras för framtiden? Föremål har länge samplats eftersom det inte finns plats i muséerna och deras magasin, men även digitala data behöver utrymme. Swedigarch kan inte lösa alla dessa utmaningar, men kan fungera som stöd till svensk arkeologi. Inte minst kan Swedigarch bidra till att synliggöra problematiken, och verka för att det tas ansvar för en hållbar lagring av data.

Öppna, digitala, data vill vi ha

En förutsättning för en digital arkeologi som är tillgänglig för alla är inte bara att utgrävningsresultaten är digitala, utan också att de digitala formaten är öppet tillgängliga. Idag använder svenska arkeologiska aktörer olika digitala dokumentationsmetoder och format. Detta utgör en utmaning vad gäller principen om öppet tillgängliga data. Swedigarch har bl.a. valt att satsa på det öppna, och kostnadsfria, programmet QGIS för att alla ska ha råd och möjlighet att kunna hantera öppna geodata. En viktig uppgift för Modul 3 är därför att utveckla tekniska lösningar så att de olika arkeologiska aktörernas digitala dataset kan ”översättas” till öppna format. I februari 2024 lanserades *Swedigarch Geotools*, en plugin till QGIS, för export av Intrasis-data till GeoPackage och CSV format. Arbetet fortsätter med att skapa plugins för export av undersökningsdata i andra format.

Att utgrävningar och inventeringar dokumenteras digitalt är numera snarare regel än undantag, men så har ju inte varit fallet under merparten av den tid som arkeologiska utgrävningar har bedrivits. Det finns därför en stor mängd äldre utgrävningar vars data inte är digitalt tillgängliga, även om det ofta finns rapporter eller mer omfattande publikationer som PDF-filer eller böcker. På sikt skulle all denna äldre information behöva föras över till digitala format, vilket inte ingår i Swedigarchs uppgifter. Däremot sker viss digitalisering av ritningar och annan dokumentation från äldre grävningar i metodutvecklingssyfte.

Digital tvärvetenskap – artefakter, ekofakter, konstruktioner, lager och landskap

Det är rutin vid dagens utgrävningar att samla in diverse prover för olika naturvetenskapliga[1] analyser. Vad skulle arkeologi vara utan 14C, dendrokronologi, osteologi och makrofossilanalyser? För att nämna några av de vanligaste. Analyser på föremål i samlingar, såsom lipidanalyser och geoarkeologiska analyser blir också allt vanligare och bidrar till att hämta ny kunskap också ur äldre arkeologiska undersökningsresultat. På landskapsnivå brukar inventering och pollenanalys berika varandra till mer fullödiga insikter om landskapets historia. Arkeologins tvärvetenskapliga karaktär utgör ytterligare en utmaning när det gäller att leta efter data, eftersom man kan behöva söka sig utanför traditionella arkeologiska kanaler för att hitta information.

Modul 4 inkluderar viktiga resurser som bland annat SciLifeLab Ancient DNA och SEAD, med avsikten att analysresultat av aDNA, makrofossil, pollen, dendro, 14C, med flera ska göras enkelt tillgängliga både genom att data läggs in i SEAD, och genom länkning till andra relevanta databaser.

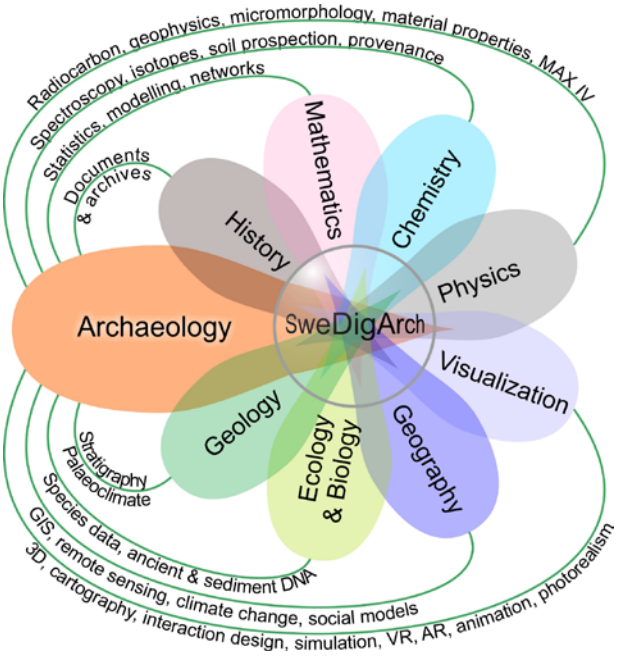

Fig. 2: Tvärvetenskapsblomman.
Figur: © Philip Buckland.
The Interdisciplinary flower.

Swedigarch har vidare en ”grön” profil, och ska främja forskning om interaktionen människa och miljö. Tvärvetenskap är därför en av Swedigarchs missioner. Även om många undersökningar och projekt har naturvetenskapliga analyser inkluderade i sina forskningsplaner (och budgetar) är det värdefullt att även kunna använda befintliga analyser och att planera och prioritera egna insatser, samt jämföra resultat. En annan möjlighet som ännu inte är så vanlig i svensk arkeologi är att använda befintliga resultat av naturvetenskapliga analyser som proxy data. Bruk av proxy data är en viktig möjlighet för forskning som inte har resurser till eget fältarbete och naturvetenskapliga analyser. Enkelt tillgängliga naturvetenskapliga analysdata ger därmed också arkeologer som saknar en stor forskningsbudget möjligheter att ta sig an nya frågor.

Lära av det förflutna – arkeologi och hållbar utveckling

Stefan Larssons föreläsning på NUA-konferensen 2023 behandlade bland annat bristen på inhämtande av kunskap från det förflutna vid dagens arbete med flyttning av Kiruna. Stefan Larsson poängterade att det finns flera arkeologiska exempel på flyttning av städer, och arkeologiska utgrävningar har kunnat påvisa både goda och dåliga erfarenheter av dessa omfattande företag. Ingen har dock efterfrågat denna information, och arkeologerna har heller inte delat med sig av sin kunskap till dagens planerare.

Detta är ett bra exempel på hur arkeologi sitter på kunskap som skulle kunna bidra till bättre lösningar på problem idag. Det är också ett exempel på hur denna kunskap inte används, eftersom den varken efterfrågas av dem som skulle ha nytta av informationen, eller kommuniceras av den arkeologiska expertisen.

Det finns också flera exempel där traditionell kunskap omsätts i hållbara lösningar, men utan hjälp av arkeologisk expertis. Till exempel kan man i det första numret för 2024 av tidningen Universitetsläraren läsa om arkitekten Marwa Dabaiehs arbete med att utveckla traditionell kunskap och naturmaterial för ett mer klimatsmart och hållbart byggande (Universitetsläraren 20240212). För oss arkeologer finns det en hel del igenkänning i dessa hållbara lösningar såsom jordkällare och lerklinade väggar. Men, om arkeologer involverades skulle vi ha mer kunskap att erbjuda som bidrag till ett mer hållbart byggande, såsom optimala bebyggelselägen, träbyggnadstekniker, mullbänkar m m.

Arkeologiska initiativ för att använda kunskap om det förflutna som bidrag till en hållbarare framtid har tenderat att handla om mer storskaliga hot, ofta naturrisker som klimatförändringar och vulkanutbrott mm. Detta kan göra de arkeologiska bidragen svåröversättliga till konkret samhällsplanering, även när råd ges för framtagande av ny policy (t ex. Cooper & Sheets 2012; Murphy & Crumley 2022; Riede & Sheets 2020).

Swedigarch har som mål att bidra till en arkeologi som kan stödja en hållbar utveckling, och kunskap som kan användas av andra samhällssektorer. Swedigarch ska också fungera som stöd till arkeologer i de krav som kan åläggas arkeologi i fråga om att beakta de globala hållbarhetsmålen (SDG) och de svenska miljömålen (Miljömålen). Inledningsvis såg vi främst arkeologins möjlighet att bidra till landskapsbaserade hållbarhetslösningar, till exempel avseende förvaltning och restaurering av ekosystem och biodiversitet. Men arkeologin kan, som ovan nämnda exempel visar, göra inspel på fler områden, och white-paper med såväl teoretiska som praktiska förslag är en planerad leverans från Swedigarch.

Framtidens arkeologi

Arkeologi arbetar framför allt med att skapa ny kunskap om det förflutna, men metoderna vi använder utvecklas hela tiden och blir alltmer tekniskt avancerade. Vi är ännu många som minns när millimeterpapper och penna ersattes av totalstationer vid utgrävningar, och stegning och kompass byttes ut mot GPS vid inventeringar. Därifrån har de tekniska hjälpmedlen utvecklats snabbt och blivit en allt större del av den arkeologiska vardagen – liksom behoven av kompetens för att hantera hjälpmedlen.

I Modul 5 tas ny teknik tillvara, utvecklas och anpassas till arkeologins behov för att skapa framtida arkeologiska data. Det kan handla om fotogrammetri, laserscanning samt lidar och 3D visualiseringsteknik mm. Ett antal tutorials för användning av metoderna finns tillgängliga på DARK Labs webbplats och fler tutorials läggs till kontinuerligt. Här hittar man också webplattformen Dynamic Collections. Syftet med Dynamic Collections är att implementera ny 3D-teknik för att stödja forskning och utbildning. Här nöjer man sig inte med att endast visualisera olika artefakter. Den digitala samlingen erbjuder även verktyg för att kunna utvinna och bearbeta information om de olika föremålen i digital version utan att behöva plocka fram originalen.

Swedigarch och historisk urban arkeologi

Svensk urban historisk arkeologi vilar på en jättes axlar: det projekt som gått till historien under benämningen ”Medeltidsstaden” (1976-1990), vars publikationer alldeles nyligen blivit digitalt tillgängliga genom DIVA. ”Medeltidsstaden” hade en hel del gemensamt med Swedigarchs ambition; att sammanställa och tillgängliggöra all arkeologi och annan relevant information rörande de svenska medeltidsstäderna för att främja forskning och kulturmiljövård.

Alla svenska historiska arkeologer, särskilt de urbant inriktade, vet vilket kraftfullt verktyg Medeltidsstaden är och vilken betydelse sammanställd och tillgängliggjord information har för möjliggörande av effektiv forskning. Projektet och dess rapporter har också haft en enorm betydelse för svensk historisk arkeologi. För dagens forskning har dock ”Medeltidsstaden” ett par svagheter; tryckta rapporter kan inte uppdateras och projektet behandlade inte städer tillkomna efter medeltiden.

Det har gjorts mycket arkeologi i våra städer, både i de med medeltida anor och i de yngre, efter Medeltidsstaden och mycken ny kunskap har producerats. I många städer finns det muséer och historiska arkeologer som kan ”sin stad” utan och innan och gärna presenterar nya rön i artiklar, föredrag och utställningar. Det är dock sällan lika väl utvecklat ifråga om digital och öppet tillgängliga data. Med tanke på städernas arkeologiska strukturer med meterdjupa kulturlager och tusentals artefakter är det en alldeles särskild utmaning att härbärgera senare års digitala data, och en ännu större utmaning att föra över analog dokumentation till digitala format. Stadsarkeologi är ju voluminös jämfört med annan arkeologi.

Vad kan Swedigarch göra för svensk stadsarkeologi? Förutom att tillhandahålla digitala data i öppna format? Swedigarchs tvärvetenskapliga profil är naturvetenskapligt inriktad, vilket medför många vinster också för stadsarkeologi och historisk arkeologi generellt. Däremot inkluderar Swedigarch inte information om vissa andra för historisk arkeologi viktiga tvärvetenskapliga källor såsom skriftligt, etnologiskt eller konsthistoriskt material. Flera av framtidens metoder som är under utveckling i Modul 5, såsom fotogrammetri och 3D- visualiseringsteknik, har stor betydelse för stadsarkeologin. Metoderna används redan, men de kommer att förbättras genom utvecklingsarbetet i Modul 5. På sikt kommer sannolikt 3D-dokumentation av kulturlager att bli standard, och förhoppningsvis kommer vi någon gång i framtiden kunna applicera Dynamic Collections digitala dokumentationsteknik av artefakter på städernas massmaterial och på så sätt digitalt bevara information för framtiden om föremål som inte införlivas i muséernas magasin utan gallras bort.

Swedigarch kommer inte att bli en ny Medeltidsstaden, inte samla historisk arkeologisk forskning på samma sätt som projektet gjorde en gång i tiden. Genom Swedigarch kommer dock data kontinuerligt göras tillgängliga, vilket möjliggör ny forskning. Den stora utmaningen är hur äldre, analog information ska överföras till digitala format. Tack vare Projekt Medeltidsstaden är dock mycket ”serverat” för kommande, digitala forskargenerationer.

Swedigarch finansieras av svenska Vetenskapsrådet (dnr 2021–00161).

Summary

The Swedigarch consortium is developing and running the Swedish National Infrastructure for Digital Archaeology, funded by the Swedish Research Council for the years 2022 to 2027, with the purpose to catalyse a new generation of data-driven research on human-environment interactions. Swedigarch is a distributed infrastructure aiming to develop, link, and make existing information and databases from various actors and institutions in Swedish archaeology accessible. Its primary raison d'être is to address the central need for open, accessible archaeological data for all researchers.

Structured across six modules, Swedigarch encompasses aspects linking heritage data, harmonising digital excavation data, integrating scientific analysis results, developing future methods and fostering digital analysis methods. It aspires to adhere to the FAIR principles – ensuring that research data are Findable, Accessible, Interoperable, and Reusable, thereby enhancing the accessibility and usability of archaeological data for future research endeavours.

Furthermore, Swedigarch aims to support interdisciplinary research, particularly focusing on human-environmental interactions, and contribute to sustainable development goals by harnessing archaeological knowledge for contemporary challenges.

In the realm of historical urban archaeology, Swedigarch offers possibilities for preserving and digitising vast amounts of data, technologies enhancing research opportunities, although challenges persist in transferring analogue information to digital formats. While it may not replicate projects like Project Medeltidsstaden, Swedigarch promises continuous accessibility to data, thus paving the way for future digital research endeavours, building upon the foundation laid by past initiatives.

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Notes

1 För enkelhetens skull använder vi ”naturvetenskapliga analyser” som samlingsbegrepp

A Medieval Greyware Assemblage from a 1990s Excavation – Rim form analysis and distribution discussion

By Erik Johansson

Background

The aim of this paper is to examine the information potential of a greyware assemblage from an excavation with a low chronological resolution, a common limitation among so-called legacy data. The starting point was *the big three* of ceramic analysis; chronology, distribution, and status (Orton & Hughes 2013:25). In this brief paper, I will focus on distribution. To do this, I will, besides the visual examination of the greyware fabrics, use morphological analysis of pot rim forms and chemical analysis using pXRF.

The site chosen, *Gyllenkrok 3, 4, 5*, is situated in the southern part of central Lund. A combination of dendrochronology and coins suggests a chronological range of the site from the 1080s to 1360s. The occupation of the site was divided into four phases, and the finds belonged almost exclusively to either phase I-II or III-IV (tab. 1) (Carelli 1991:8).

The town block called Gyllenkrok was divided into eight narrow plots during a period in the late 11th to early 12th century. In the 13th century, the structure changed again into two large plots (Carelli 2001: 111). Roughly at the same time, perhaps as early as the last quarter of the 13th century, a half-cellar building was erected in the northeastern corner of the Gyllenkrok block (Salminen 1992; Johansson 2020). The building was torn down during the first half of the 14th century. On the other side of the street, the parish church, Sankt Stefan, had been rebuilt from a wooden stave church into a stone church during the first half of the 12th century. A west tower was added during the second half of the 12th century (Mårtensson 1981).

The hard greyware from Gyllenkrok 3, 4, 5

Greyware can be divided into soft and hard greyware (Erdmann et al. 1984). The terms have varied much in research, and the delimitation between soft and hard greyware is fluid and diffuse. During the 12th century, soft greyware changed into hard greyware. In Ribe (Madsen 1999) and Lübeck (Drenkhahn 2015) this has also been observed, and terms like A1 (between A0 and A2), and harte Grauware A (between weiche Grauware and harte Grauware B) have been used to signify the differences.

Three chronological checkpoints can be noted for hard greyware: 1. rilling on the neck appeared during the second half of the 12th century, 2. pots received a single handle in the period 1180-1200, 3. three feet were attached around 1220, although tripods did not become common until late 13th century. The use of hard greyware pots in Lund reached a peak in the period 1270-1320, after which they gave way to redware pots and metal vessels.

The diagnostic sherds from Gyllenkrok 3, 4, 5 of hard greyware consists of sixty-three rims, ten legs, ten strap-handles and two bases. Forty sherds can be assigned to a vessel shape: thirty-four pots, five jugs and one bowl (in total 5.3 eve). The mean rim diameter is 14.7 centimetres. It is estimated that the ten fragments of legs represent four or five tripod pots, and the ten strap handles represent ten handled pots. Some of the legs and handle fragments could represent the same pot. 53 per cent of the rim sherds show fine, regular, horizontal parallel striations on both external and internal surfaces. 45 per cent have either no striations or only external striations. This indicates that a slight majority of the hard greyware pots from Gyllenkrok 3, 4, 5 were wheel-thrown (Roux 2019: 180).

Visual examination

Lacking chronological resolution and single context affiliation, the hard greyware has been grouped based on the coarseness/fineness of the fabric. This evaluation has been made through visual inspection with the aid of macro-photography and a 10x magnifying glass. Percentage inclusion estimation, sphericity/roundness and inclusion sorting charts have functioned as guides in the grouping of the hard greyware (Orton and Hughes 2013: 282-284).

Coarse Hard Greyware (GI)

This group consists of nine rim sherds, representing seven or eight vessels. Six out of nine sherds are from Phase II (before 1175), and the other three are from Phase III (after 1175), suggesting an early date of the group. The rim sherds have belonged to round-based pots with a rim diameter ranging from 12 to 19 centimetres.

The sherds in GI lack visible striations, even though some have subparallel horizontal lines. This suggests that the vessels were not made on the wheel, throwing or coiling but rather handmade (Valentine Roux, personal communica-

Common name	Number of sherds phase I-II (1080–1175)	Number of sherds phase III-IV (1175–1360)	Percentage phase I-II	Percentage phase III-IV
Baltic ware	1947	1079	97.3	43
Hard greyware	18	487	0.9	19,5
Glazed redware	25	721	1.25	29
Andenne ware	6	17	0.3	1
Pingsdorf type ware	1	24	0.05	1
Proto-stoneware	3	116	0.15	4.5
Stoneware	0	41	0	1.5
Miscellaneous	1	16	0.05	0.5
Total	**2001**	**2501**	**100**	**100**

Tab. 1. The pottery of Gyllenkrok 3, 4, 5. The number and percentages of sherds are divided by phase.
Keramiken från Gyllenkrok 3, 4, 5. Skärvornas antal och procent är fördelade per fas.

tion 2021). Furthermore, the sherds in this group all have large angular inclusions, signifying a crushed rock temper or a naturally coarse clay as raw material that has not been sifted or prepared to any apparent extent. The surface granularity of GI is characterised by protruding grains, partially covered by a fine clay layer.

The fabric surface and structure are homogenous in GI, indicating a similar manufacturing process of coiling and smoothing out the wet paste with added water, drying in a controlled atmosphere (no drying cracks are visible in the group), and probably firing in pits. The fabric is similar to Baltic ware, but forming and firing are different. In the Baltic ware corpus, the fabric generally has more brownish tones and the cross section is often marbled. All sherds except two in GI have a uniform grey or dark grey colour of the cross-section, which could indicate a more controlled reduction firing process. The brownish tones and colour-shifts often seen in Baltic ware suggest a more mixed firing atmosphere, where oxygen affected the colour of the fabric. Furthermore, the Baltic ware was wheel-coiled, resulting in striations and horizontal fissures. GI have no striations or fissures and was most likely hand-formed without using the tournette.

Medium Hard Greyware (GII)
This is the largest group, comprising twenty-nine rims (note the effect of having three groups is risking overcrowding the middle group). The majority of the rims are from round-based pots with a mean rim diameter of 14.5 centimetres. Two sherds in GII date to Phase II (1075-1175), thirty-three to Phase III (1175-1225) and two from Phase IV (1225-1300). Two sherds have a light brown fabric; the rest range from dark grey to light grey, whereas less than a third have more brownish nuances. Horizontal parallel striations on both the external and internal surfaces are visible on twenty-six sherds (circa 70 per cent) in GII. Six sherds have striations visible only on the external surface, two have no striations, and two are unclear. In other words, most vessels belonging to this group were wheel-thrown.

Fine Hard Greyware (GIII)
This group consists of ten rims, all with a finer fabric than GII. Two sherds belong to Phase II, and eleven sherds to Phase III. The sherds represent eleven vessels with a diameter ranging from 11 to 17 centimetres. The mean diameter is 14 centimetres, the same as GII, but smaller on average than GI, which had a mean diameter of 16 centimetres. The colours of GIII range from grey to brown, most having a homogenous matrix colour, but some with a slight colour shift between core and margins, indicating an unfinished firing process (intentional or unintentional). Four rim sherds do

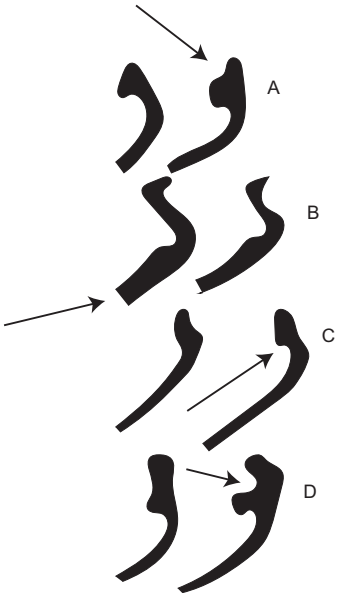

Fig. 1. Each pair represent a different potter and the forms with the greatest variation, the extreme pair out of several rims. The arrows point to the morphological trait that varies the most: A, furrow on edge. B, thicker neck. C, more pronounced edge overhang. D, accentuated profile. Illustration from Miller 1985, redrawn by author.
Varje par representerar olika krukmakare och formerna med störst variation, det extrema paret av flera mynningar. Pilarna indikerar det morfologiska attribut som varierar mest: A, fåra på kant. B, tjockare hals. C, mer distinkt kantöverhäng. D, accentuerad profil.

Fig. 2. Small pot rims from Canterbury. Illustration from Cotter 1997, redrawn by author.
Mynningar från små krukor från Canterbury.

Fig. 3. Small pot rims from Canterbury. The distinct morphological traits indicate the style of another potter. Illustration from Cotter 1997, redrawn by author.
Mynningar från små krukor från Canterbury. Den distinkta morfologin indikerar en annan krukmakares stil.

Fig. 4. Continental-style small pot rims from Canterbury. The depicted rims might be from a third potter. Illustration from Cotter 1997, redrawn by author.
Mynningar från små krukor i kontinental stil från Canterbury. Den här mynningstypen kan vara från en tredje krukmakare.

not show any internal striations indicating hand forming; these date to Phase III. As with GII, some sherds with a fine fraction matrix were not wheel-thrown.

Type, Morphology and Variation

Type is *"*a covering term for a collection of varieties*"* (Read 2007: 92) and is regarded as something created by the potter and later discovered by the analyst (emic). Hence, types are made up of attributes with *cultural saliency* (Arnold 1985: 236; Read 2007: 86; Nonaka et al. 2024), and when potters, based on mental images and motor habits, make pots, the stylistic value of their culture is embedded in the type (Nonaka et al. 2024). Within-type variation is the result of several potters working within a shared "conceptual system" (Read 2007: 89), and between-type variation is the result of potters working in different conceptual systems. This usually has spatial value. Hence some types are dominant in one region, while other types are dominant in another (Read 2007: 86; De Groote 2008: 417).

Presenting the rim typology of an assemblage is therefore important, but it is equally important to present the quantitative distribution of the different types (tab. 2). In this way, the typology becomes instrumental (Read 2007: 22) - it comes to serve a specific purpose.

Ethnographic studies have shown that the variation of one potter making the same type of vessel is very limited (Miller 1985: 42) and might only diverge based on vessel shape, size and intended

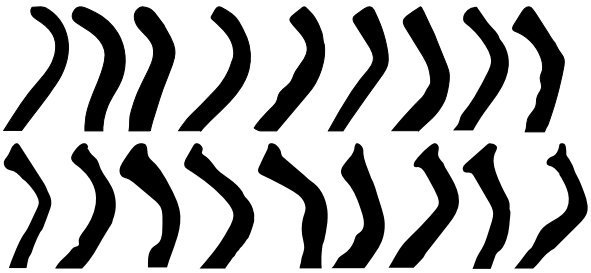

Fig. 5. Pot rims from the Kragelund kiln. Illustration from Jessen 1998, redrawn by author.
Krukor från Kragelundugnen.

function. It is important, however, to understand that rim form varies in subtle ways between every thrown or hand-formed vessel (De Groote 2008: 35). A multitude of factors contribute to these small variations, from the type of clay used to such things as the weather or the mood or idiosyncrasies of the potter (Read 2007: 90). Figure 1 aims to illustrate such subtle variations.

Kiln wasters

We can get a better understanding of rim forms and style variation by examining rims from kiln wasters. Kiln wasters are bound to a single kiln and are more likely to be from a single or a couple of workshops than a consumer assemblage. They can, I argue, work as an analytical bridge between the ethnographic assemblage and the consumer site assemblage.

The following examples all depict rims from small cooking pots. The first example is an assemblage of wasters from a Canterbury kiln, approximated to have been in operation between 1140 and 1175 or perhaps as long as 1200 (Cotter 1997). 1031 rims could be sorted into thirty-one types, and few rim forms were truly identical, and the morphological *evolution* between forms made it difficult to delimit types from one another (figs. 2, 3 & 4) (Cotter 1997).

Examining the rim typology of the Cambridge assemblage in light of the ethnographic example, I suggest there were at least three potters during the years of operation. There is clear variation between types and subtle variation within types.

Another example comes from Kragelund in Denmark, where an excavation revealed a pottery kiln and a pit of wasters dated roughly to the 13th-14th century. The waste material was interpreted to be from more than one firing (Jessen 1998: 15; Jessen 2001) and consisted of a minimum of fifty-four different vessels. (Jessen 1998: 47). The round-based vessels were divided according to their measurements into pots, bowls, and plates. The pots had a rim diameter of 11-20 centimetres and will serve as the example here (fig. 5). I argue that the range of forms represents two potters.

Typology

The typology of hard greyware from Gyllenkrok 3, 4, 5 is derived from a much larger set of sherds from Lund (the latter a result of my ongoing Ph.D.-project at Lund University). I have deliberately divided the types according to subtle differences so as to catch the scope of variety in the material. This has the advantage of allowing re-grouping. Allowing too much variation for one type (lumping) makes splitting the group difficult (Orton & Hughes 2013: 78). Pottery is a mass-material, and the classification inevitably contains subjective judgement from the analyst as well as anomalies. For example, one sample of types 30 and 31 has coarse fabric. Since the typology is based on morphological criteria, they remain as types 30 and 31 rather than as type 26, which is generally coarser. Type 26 has a thicker neck and is thus morphologically separated from types 30 and 31. This is not to say that the types are not related.

Type 30 is the most common in the Gyllenkrok 3, 4, 5 assemblage. Analogies with type 30 can foremost be found in Lübeck (Drenkhahn 2015: 82 ff). Analogies in Schleswig (Lüdtke 1985: 42) and Ribe (Madsen 1999: 109) differ in subtle ways based on published illustrations. The most common types in Lübeck, however, are types with a rounder edge, corresponding to type 31 in the Lund assemblage.

pXRF and PCA

To evaluate the morphological analysis, which was based on ethnographic examples and the kiln wasters, we can use chemical analysis. A portable X-Ray Fluorescence Spectrometer (pXRF) is a handheld device used in non-destructive ceramic petrography since 2005 (Hunt & Speakman 2014; Holmqvist 2017). The material from Gyllenkrok 3, 4, and 5 were analysed at the Lund University Department of Geology using a Thermo Scientific Niton XL3. The following elements were

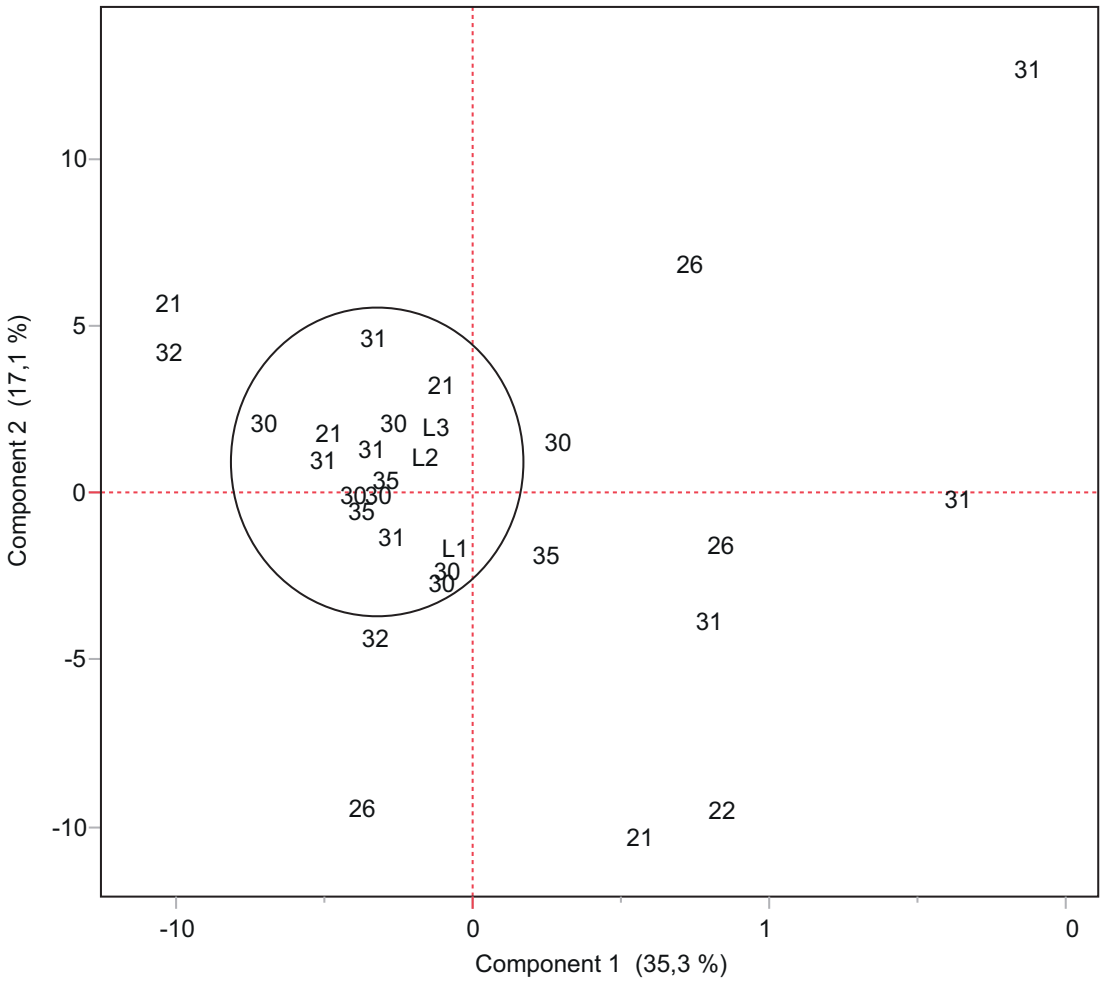

Fig. 6. PCA scatter plot of pot rim types from Gyllenkrok 3, 4, 5. The reference samples L1-3 refer to Scanian glazed redware jugs presumed to have been made in the vicinity of Lund. Single types and anomalies have been omitted from the PCA.
PCA-diagram över mynningstyper från Gyllenkrok 3, 4, 5. Referenserna L1-3 avser Skånekannor sannolikt tillverkade i området kring Lund.

Group	Type							Sum
	 21	 22	 26	 30	 31	 32	 35	
Coarse	2		4	1	1			8
Medium	2	2	3	7	4	2	3	21
Fine	1			4	2			7
Sum	5	2	7	12	7	2	3	**36**

Tab. 2. Rim form typology of Gyllenkrok 3, 4, 5 distributed among coarse, medium and fine hard greyware groups. Twelve single types and anomalies have been omitted from the typology.
Typologi över mynningsformer från Gyllenkrok 3, 4, 5 fördelat på grov, medel och fint yngre svartgods. Tolv enskilda typer och anomalier har utelämnats från typologin.

included in the analysis: Aluminium (Al), Iron (Fe), Potassium (K), Magnesium (Mg), Manganese (Mn), Niobium (Nb), Rubidium (Rb), Silicon (Si), Strontium (Sr), Titanium (Ti), Yttrium (Y), Zinc (Zn) and Zirconium (Zr). The data from the pXRF measurements has been analysed using Principal Component Analysis (PCA). PCA is a multivariate analysis that is used to analyse large amounts of data (Orton & Hughes 2013: 176). The result can be portrayed as a two-dimensional scatter plot diagram. The distance between samples represents their level of similarity of the chemical composition of the clay.

Conclusion

The aim of this paper has been to investigate the information-potential from a low-chronology assemblage. First and foremost, it can be concluded that despite the construction of a typology based on the composition of the fabric and the pot rim forms, compared with a material from a site with high chronological resolution, it did not result in better dates of the original material. This must be considered a limitation. However, the comparison showed a correlation between fabric coarseness/fineness, rim form typology and chronology. This is best exemplified by the development of the coarse type 26 into the finer type 30.

But what can we say about the provenience of the types and the distribution of hard greyware? As mentioned above, types have cultural salience, and different types indicate different conceptual systems among potters. If the variation is sufficient between two types, it can thus be assumed they were made by different potters schooled in different craft traditions, likely from different regions. In this case, the hard greyware pot rim typology from Gyllenkrok 3, 4, 5 examined in the light of the morphological variations of the kiln wasters, I argue that the entire material has the potential of being from the same kiln site, at least based on form alone. The between-type variation is not sufficient to warrant the conclusion that the assemblage stems from potters based throughout a wide geographical area. Still, this does not necessarily mean that the assemblage is the product of a single potter. Both the time span and the different manufacturing methods indicate otherwise.

Considering the pXRF-PCA, some types clearly come from the same area. These might be from the same potter, and what we see is actually *within-type variation*. The types might also be discrete types from potters sharing a kiln. The small morphological differences can be due to chronology and the result of different generations of potters working in the same area. Hartwig Lüdtke proposed a scenario with communal kilns as stage two in his scheme of production organisation of medieval potters in Schleswig (Lüdtke 1985:118-119). Other types clearly diverge chemically. Some of these types were, however, also made close to Lund. This could reflect the movement of potters originally based in the same form tradition, for instance, apprentices setting up shop in a different area, using different clay. In this way, the pattern of the scatter plot could represent a multi-generational distribution situation showing pots produced in different areas within the Lund town-hinterland consumption sphere over the course of the High Middle Ages.

Summary

This paper explores the information potential of a greyware assemblage from an archaeological site with low chronological resolution—a common issue with legacy data. The study focuses on the distribution of greyware, analysing its fabric, rim forms, and chemical composition using portable X-ray fluorescence (pXRF). The site, Gyllenkrok 3, 4, 5, located in southern central Lund, spans from the 1080s to 1360s based on dendrochronology and coin evidence. The greyware assemblage, lacking precise chronological context, is grouped by the coarseness or fineness of its fabric. Furthermore, this paper examines kiln wasters as a bridge between ethnographic and consumer site assemblages, arguing that they offer insights into production variations and serve as analytical references.

The greyware typology was derived from a larger dataset of sherds from Lund as part of the author's ongoing doctoral dissertation. Types were distinguished by subtle differences to capture material variety, enabling later re-grouping. The morphological analysis, grounded in ethnographic examples and kiln wasters, revealed correlations between fabric coarseness, rim typology, and chronology. For example, the coarse type

26 transitions into finer type 30 over time. However, despite this correlation, the typology did not significantly improve the chronological dating of the assemblage.

Provenance and distribution analysis revealed further insights. Variations between types suggest cultural distinctions and conceptual differences among potters, implying the influence of diverse craft traditions and geographic origins. Nonetheless, the limited variation in this assemblage suggests that the material in theory could have originated from a single kiln site. However, the extended time span and differing manufacturing methods argue against it being the work of one potter. Instead, it might reflect a multi-generational production scenario.

Chemical analysis using pXRF combined with principal component analysis (PCA) offered additional evidence about the greyware's origins. Certain types shared chemical signatures, potentially indicating production by the same potter or within the same area. This within-type variation could also result from chronological changes or the work of successive generations of potters sharing a kiln. Communal kilns, as proposed in Hartwig Lüdtke's production organization model, provide a plausible context for these findings. Conversely, types with diverging chemical profiles suggest the movement of potters trained in similar traditions but operating in different locations. For instance, apprentices may have established workshops elsewhere, using different clays but maintaining stylistic continuity.

In conclusion, the study demonstrates that even with limited chronological resolution, integrating morphological and chemical analyses enhances our understanding of greyware assemblages. It highlights the potential to infer production practices, cultural traditions, and distribution networks, contributing to broader insights into medieval ceramic production and trade systems.

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Towards a Registration Praxis for Clay Tobacco Pipes with an Awareness of Smokeways

By Robert Bergman Carter

Although much effort has gone into coupling Swedish clay tobacco pipes from archaeological contexts to their makers in order to apply pipes for chronometric purposes (see, for example, Åkerhagen 2012a), efforts to identify how much individual pipes cost and if and how they were engaged in negotiations of social standing, have been limited. The potential for applying clay tobacco pipes for such analyses has been explored in the Netherlands since the early 1980s (Duco 1980; Duco 1981). Understandings of industry standards and attributes relating to variations in price and types, generated from comparative contextual studies of pipes and archival records, have resulted in recording praxes geared towards quantifying such attributes, thus making consumption behaviours in the past increasingly salient (Oostveen-Bonnema & Oostveen-Bonnema 2001; Konijnendijk 2015; Higgins 2017).

My project sets out to explore if and how pipe smoking, in general, and the pipes themselves in particular, were applied in negotiations and expressions of social status in 18th-century Sweden via the heuristic concept of *smokeways*. Smokeways as a concept is to be understood as variations in smoking practices that, in turn, can be interpreted as employed in negotiations of social status. Documentary sources from the period indicate that smoking was a practice regulated by social proscriptions in Sweden (Bergman Carter 2014), and it has previously been pointed out that the social order of the early modern period depended on *recognisability* manifested in distinguishing practices in fvolving the consumption and display of objects (Runefelt 2015).

One starting point and basic assumption of my study is that different social groups practised or were at least expected to practice different smokeways in the past, which were linked to the recognisability of social identities, creating social distinction through variations in consumption practices. Drawing on social practice theory as outlined by Shove, Pantzar and Watson (2012), which proposes that materials, meaning, and knowledge are elements required for a practice to occur, I suggest that archaeologically recovered pipes be treated as material elements that, in conjunction with historical sources have the potential to act as indicators of the smokeways they were once employed in. This, in turn, is hoped to contextualise fragments of clay pipes from the archaeological record as evidence of manifestations of social status.

Smokeways as a consumption practice in this sense should also be understood as what Colin Campbell outlines as "*the selection, purchase, use, maintenance, repair and disposal of any product* […]" (Campbell 1995: 102). A prerequisite for considering clay pipes in such terms is an understanding of the different attributes of a varied range of clay pipes available for the smokers of 18th-century Sweden that were applied in said varied smokeways. The aim of the study at hand has, therefore, been to identify diagnostic and recordable attributes of pipes of different price categories to provide an empirical basis applicable in a post-excavation recording praxis that considers how pipes were applied beyond their function as instruments of tobacco consumption.

This study takes its point of departure in intact clay pipes excavated in 1984 from a warehouse that belonged to the Stockholm pipe factory owner Olof Forsberg, most likely deposited in the archaeological record in 1759. An ocular inspection of their attributes has acted as a proxy in comparative studies of archival material pertaining to the Swedish clay pipe industry of the 18th and early 19th centuries.

Material and Method

In the study at hand, a selection of the intact Forsberg clay pipes held by the Stockholm City Museum has been analysed. The pipes in the study were manufactured in the 1750s in a factory that belonged to Olof Forsberg and were recovered in Stockholm, Sweden, in 1984. The selection was based on previous attempts at categorising the pipes in the assemblage carried out in the 1980s and early 1990s, which were primarily focused on identifying types and the number of moulds used to make the pipes (Brynja 1985; Brynja, Loewe, Duco & Frankow 1987; Åkerhagen 1992). Analyses of mould variation identified between twenty-three and thirty-one moulds used to make fourteen, possibly fifteen types. While stem measurements from Åkerhagen's analysis (1992) have been applied, the division of types based on mould variations was instead grouped according to the type they represent in a recently discovered price list (anonymous 1753). For example, the four types with similar stem lengths and the

number 3 in moulded relief on either side of the heel manufactured in different moulds have been grouped in this study as they were all manufactured and sold as the same type – *Bred Klackar No. 3* in the 1750s.

In a first step, the intact pipes were identified and coupled to their corresponding names in the abovementioned price list from 1753 (anonymous 1753), which corresponds more closely to the types in the assemblage than the two previously known price lists (Åkerhagen 2012b [anonymous 1745 and 1747]: 19–20). Intact pipes were defined as having a relatively intact bowl, an intact heel or spur, an intact stem and a visibly cut mouthpiece rather than a broken stem.

A manufacturing description from the pipe factory in Alingsås (SE/GLA/10003. 1618 – 1799) states that longer pipes were more expensive, not only due to stem length but also due to a relatively higher level of care taken during manufacturing. Long pipes are described as being polished and placed in special grooved trays to prevent their stems from warping during drying, while short pipes were only trimmed from mould flashes and not polished. Short pipes were dried on flat rather than grooved trays, which would have resulted in a higher occurrence of warped stems. Based on the manufacturing description from Alingsås, short and relatively inexpensive pipes could also display coarser surfaces and more scars from trimming tools than expensive pipes, as these would not have been removed during polishing. Such tools and drying trays are also mentioned in probate inventories of other pipe factory owners, indicating that these manufacturing techniques were shared across Sweden.

The second step was, therefore, to combine and record visible attributes on the pipes known to be the results of different steps in the manufacturing process in descriptions of manufacturing methods in the Netherlands (Duco 1980), England (Higgins 2017) and Sweden (SE/GLA/10003. 1618 – 1799) known to have been closely linked to production quality and the price of pipes. The attributes considered were stem length, traces of finish and surface treatment of rims, bowls, and stems, as well as stem straightness for each type of pipe.

The third step was to link the above-mentioned data to prices from Forsberg's price lists (anonymous 1743; 1747; 1753) and compare those to surviving price information from other Swedish 18th-century factories. As part of this step, stem measurements were converted from centimetres to Swedish *verktum* in order to compare stem lengths to an advertisement specifying stem lengths of pipes from Alingsås (anonymous 1787). A *verktum*, a Swedish inch, is 2.47 centimetres. Price information is currently known from factories in Stockholm, Norrköping, Falun, and Alingsås, while only estimates are available from the Arboga factory (see tab. 1).

Results

Except for the *Turkhufwud* (presumably a socketed bowl made from red-firing clay imitating pipe bowls made in the Ottoman empire), *Långa Krusige* (long pipes with scalloped bowls), *Långa Kron-Pipor* (long crown-pipes) and the *Lång Porcellin* (a type imitating contemporaneous long Dutch pipes) twelve types were positively identified and two were tentatively identified from the 1753 price list (tab. 2).

Of the fourteen types identified, four had stems of circa 17–21.5 Swedish inches and were interpreted as belonging to the segment of long pipes found in price lists. Five types had stems measuring between 12 and 13 inches, which were interpreted as belonging to the medium segment in the surviving price lists. Finally, five types with stems measuring between 8 and 9 inches were identified as belonging to the segment short pipes in the price lists. Stem lengths vary slightly within each type as a result of the pipe maker cutting the stem around the wire used to make the bore to slightly different lengths.

Most pipes in the long segment showed signs of having been manufactured with more care than the pipes in the medium and short segments. Some of the pipes in the long segment displayed cracks on the surface just above the bowl-stem juncture, which indicates that not all bowls of the long types were polished. As the armorial pipes have moulded relief on their bowls, these could not be polished without affecting the moulded design. However, parallel striations on the stems of armorial pipes show that the stems on these pipes were relatively thoroughly polished (fig. 1). Meanwhile, pipes identified as *Ordinair Porcellin* showed lesser signs of polishing. The *Ordinair Porcellin*, on the other hand, are the only pipes in the assemblage with bottered rims with milling

Name	Location	Source
Carl Aspegren	Stockholm	SE/SSA/0138/F 6 b/10 1736
Olof Aspegren	Stockholm	SE/SSA/0145A/F 1 A/171 1758
Olof Forsberg	Stockholm	anonymous 1743; 1747; 1753
Daniel Almqvist	Stockholm	SE/SSA/0145A/F 1 A/182 1760
Carl Wettervik	Stockholm	SE/SSA/0145A/F 1 A/330 1798
Catharina Spak Wettervik	Stockholm	SE/SSA/0145A/F 1 A/450 1827
Daniel Friederich Theel	Falun	see for example SE/RA/420132/3/Da 1/13 1758 and SE/RA/420132/3/Da 1/36 1782
The Alingsås factory	Alingsås	see for example SE/RA/420132/3/Da 1/1 1740–1747
The Norrköping factories	Norrköping	SE/RA/420132/3/Da 1/13 1758
Mathias Nyberg (only type names)	Stockholm	SE/SSA/0145A/F 1 A/336 1799
Düring and Westén's factory (type names and relative cost)	Arboga	SE/ULA/10018/3 1750-1821

Table 1. Archival sources containing price information for clay tobacco pipes manufactured in 18th- and early 19th-century Sweden.
Arkivkällor med prisinformation för kritpipor tillverkade i Sverige under 1700- och 1800-talen.

Fig. 1 The stems of Forsberg's armorial pipes show signs of polishing. Photo by Robert Bergman Carter 2022.
Skaften på Forsbergs vapenpipor visar spår av polering.

and stem decorations in the form of a band stamp – manufacturing steps that would have increased the price of this type.

Tool scars on bowls and stems and warped stems appear to be more of a rule than an exception for pipes in the medium and short segments. Bowls with moulded relief decoration, the heart pipes and the scalloped pipes, showed only signs of removal of mould flashes for the same reason as the armorial pipes mentioned above. Some pipes in the medium and short length and price segments show signs of having been smoothed with a tool known in Swedish as *smudrare*, used to compress mould lines. Some pipes show signs of only having had mould flashes scraped off with a knife, with no signs of smoothing, polishing or any other attempts at masking tool scars or mould imperfections. Apart from the scalloped-bowled short pipes, the stems of these pipes are also warped to a higher degree than their long counterparts, commonly from left to right or right to left, with many also protruding up or down, thus indicating that these were dried on flat drying trays rather than drying trays with slots or grooves which would have allowed them to dry in fixed positions.

The stems of the long pipes were generally significantly less warped than their shorter counterparts. Most likely, this shows that grooved trays mentioned as used for the drying of long pipes in the Alingsås description were also in use at the Forsberg factory. Some of the long-stemmed three crown pipes had stems that were slightly bent upwards, possibly due to slumping in the drying tray prior to firing.

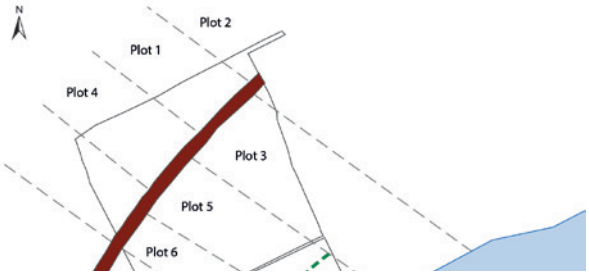

Fig. 2 The unpolished "Heart Pipes" belong to the medium price- and length segments and have relatively warped stems. Photo by Robert Bergman Carter 2022.
De opolerade Hjärtpiporna tillhör medelsegmentet i hänseende till pris och skaftlängd och har relativt krumma skaft.

In comparing the prices of Forsberg's pipes to price information from other pipe manufacturers of the 18th century, several similarities have been found. Long pipes, measuring from 15 inches and upwards, cost between 8 and 21 dalers 16 öre per gross, where the cheapest pipes in the segment, much like Forsbergs *Ordinair Porcellin*, were likely only sparingly polished. Medium pipes, measuring around 12 to 13 inches, cost between 3 and 6 daler per gross, with the possible exception of polished medium pipes made in the Almqvist factory that cost 16 daler for a gross. Short pipes, between 8 and 11 inches, consistently cost between 2 daler 8 öre and 3 daler 24 öre per gross.

Naming traditions and prices of certain pipes appear to have been relatively homogenous throughout the 18th century. For example, all factories and workshops from which pipe names are known manufactured a type referred to as No. 3. With the exceptions of earlier price lists from Forsberg's factory, which contain medium length No. 3, these pipes are consistently found in the least expensive segment, from the very oldest price information from 1735 (SE/SSA/0138/F 6 b/10 1736) to the most recent listing from 1827 (SE/SSA/0145A/F 1 A/450 1827).

Many factories and workshops in Stockholm, as well as the Alingsås factory, manufactured pipes referred to as *The Arms of Sweden* or *Pipes with Arms*, which, similarly to Forsberg's pipes, are most certainly armorial pipes with variations of the great coat of arms of Sweden in moulded relief on their bowls. These are, apart from a less expensive type called "*small [construed as short] arms of Sweden"* listed in Carl Wettervik's probate inventory (SE/SSA/0145A/F 1 A/330 1798), consistently found among the most expensive pipes, beginning with the oldest mentioning in archival sources from 1745 (anonymous 1745) and the most recent from 1827 (SE/SSA/0145A/F 1 A/450 1827).

Similarly, what were most likely copies of Dutch pipes referred to as either *Porcelain*, *Ordinaire*, or *Dutch pipes* in archival sources commonly belong to the most expensive segment. Archival sources from the Falun pipe factory mention a type called *Ordinaire* that costs 12 daler copper per gross, and a type called *Porcellin* that costs 13 daler 16 öre copper per gross, which may refer to pipes with a shared morphology but with different surface treatments. Another such example is found in the probate inventory of pipe factory owner Daniel Almqvist (SE/SSA/0145A/F 1 A/182 1760), which contains a type called *Medel Porcellin*, which likely refers to a medium-length Dutch-style pipe. The relatively high cost for a pipe in the medium segment, 16 daler per gross, may be due to added production steps such as bottering, milling, polishing and the addition of a band-stamp across the stem to complete the impression of a contemporary genuine Dutch pipe.

Types referred to as three crowns are known from factories and workshops in Stockholm and Falun and generally belong to the most expensive segment. These pipes are commonly stamped with the location of the factory, three crowns, and occasionally the initials of the factory owner on the side of the bowl facing the smoker (also known in Sweden as the front of the bowl), while on some pipes the three crowns are in moulded relief. At some factories, such as Karlskrona, Varberg, Norrköping, and most likely Alingsås, designs with three crowns were stamped or moulded onto pipes that, based on their surface treatment, were not necessarily expensive. This was also the case at the Forsberg factory, where a relatively coarse medium-length pipe was stamped with STOCKH three crowns and the initials OF.

So-called heart pipes (fig. 2), pipes with a crowned heart in moulded relief on the fronts of bowls, do not appear to have been made in factories and workshops outside Stockholm. Based on price comparisons, these consistently belonged to the medium-length and mid-price segments.

Pipes with scalloped bowls (referred to in archival sources as *krushufwuden* or *räffelnackade*)

Types identified in assemblage	Approx. stem lengths in verktum, Swedish inches	Surface treatment/ Production quality	1753 cost range (daler & öre copper) per gross
"Long" pipes: Armorial pipes, "Porcelain" pipes, Three Crown pipes	18.5 to 21.5	Several types polished/Good	8 to 15 daler
"Medium" pipes: Scalloped bowls, Heart Pipes, Medium Pipes	10 to 13	Some with traces of polishing/Good-poor	4 daler 16 öre to 6 daler
"Short" pipes: Scalloped bowls, No. 2, No. 3 (No. 1)	8 to 9	None polished/Poor	2 daler 24 öre to 3 daler 8 öre

Table 2. Stem lengths, surface treatment/production quality and price of the pipes in the Forsberg assemblage. *Skaftlängd, ytbehandling/produktionskvalitet och priser för pipor i Forsbergs magasin.*

Alingsås pipe types	Stated stem length (Swedish inches) in 1787	Cost per gross in 1754, daler copper
No.1	8.5	3 daler
No. 3	10.5	3 daler
No. 4	11	3 daler
No. ½ 5	13.5	4 daler 16 öre
No. 5	15.5	5 daler
No. 6	20.5	9 daler
No. 7	24	18 daler
With Arms	N/A	18 daler

Table 3. Stem lengths, and price of the pipes manufactured in Alingsås in 1787 (anonymous 1787) compared to prices from 1754 (SE/RA/420132/3/Da 1/9 1754 – 1754). *Skaftlängder och priser för pipor tillverkade i Alingsås år 1787 jämförda med priser från år 1754.*

morphologically similar to English pipes, or lobed bowls (*musselhufwuden*) imitating Dutch *lobbenpijpen* also appear to have primarily been manufactured in Stockholm, as outside of Stockholm they are only mentioned in the annual reports of a Norrköping factory during one year (SE/RA/420132/3/Da 1/14 1759). There are no indications of such pipes ever having been made in Alingsås, Falun, Varberg, Arboga or Karlskrona. Forsberg's factory made long, medium, and short scalloped bowl pipes, and variations in price indicate variations in both stem length and stem surface treatment, as the bowls cannot be polished due to their moulded relief decorations.

A comparison of prices and stem lengths of pipes made at the Forsberg factory and the Alingsås factory (tab. 3) shows that although factory-specific mould designs and marks certainly existed, most Swedish factories and workshops appear to have conformed to standards in regard to bowl forms, stem lengths, surface treatments and prices. This is also reflected in factory-mutual piecework wages known from archival records. In turn, this resulted in a relative homogeneity of the products available for 18th-century smokers. Swedish clay tobacco pipes, regardless of which factory made them, may have differed in factory-specific markings and bowl decorations, yet

general bowl form and sizes, stem lengths and surface finish, in most cases, were made in accordance with standards. These standards appear to have been established by the first chartered pipe makers, possibly as early as the 1710s.

Concluding discussion

The prices of pipes from the Forsberg factory can be said to correspond to the visual appearances of pipes that depend on the skills of the workers and the manufacturing steps required to make them. Stem length, polishing, decorations, and stem straightness appear to have been important factors in the pricing of Forsberg's pipes. The difference in appearance between a coarse *No. 3* pipe with a warped stem of 20 centimetres and a long *Arms of Sweden* pipe with a relatively straight polished stem of over 40 centimetres is as striking today as it would have been in the 18th century.

With the Forsberg assemblage and its associated price lists as a proxy, the inference of comparative studies of archival material from other Swedish pipe makers is that Swedish pipe factories and workshops, with some exceptions, produced, named, and priced their products according to industry standards. Although some exceptions appear to have existed, expensive long pipes were generally polished and dried in grooved trays to ensure stem straightness. Medium and short pipes were, with few exceptions, less carefully finished, which resulted in coarser surfaces and warped stems.

Archaeological and archival evidence suggests that these standards were well-established among pipe makers in Sweden and highly likely also recognised by consumers and onlookers alike. This standardisation of prices, stem length, stem straightness and surface finish, I argue, should be seen as a result of pipe factories responding to idealised notions of recognisability of the material elements employed in smokeways in 18th-century Sweden. As such, short, often slightly warped and coarse pipes were manufactured with the smokeways of commoners and peasants in mind. People who belonged to these social groups were expected to accept and employ these material elements as they embodied notions of recognisability specific to the poorer classes. Meanwhile, expensive long and medium, polished and straight-stemmed pipes were intended for the smokeways of those who were assumed to be able to afford them. Aristocrats and wealthy burghers were expected to practice distinguishing smokeways in which such pipes played an important and immediately recognisable part.

Variations in these relatively standardised attributes reflecting the varying prices of pipes remain observable on fragments recovered from the archaeological record. The results of this study suggest that attributes such as stem finish and stem straightness are worthwhile to consider for the recording of pipes should one wish to gain a better understanding of the relative costs of pipes. If price is believed to be a factor to consider for analyses of socioeconomic status via smokeways, pipe fragments have the potential to be considered as material representations of notions of recognisability. Thus, there is as much validity to considering and recording attributes of Swedish pipes related to variations in production quality and price on both bowls and stem fragments as there is for Dutch and English pipes.

As these seemingly standardised variations are observable, they are quantifiable and recordable. As such, contextual analyses and recordings of Swedish pipe fragments have the hitherto unexplored potential to make salient aspects of both adherences and deviations from idealised smokeways. For example, fragments of expensive pipes recovered from milieus known to have been inhabited by poorer classes may lead to insights into how material culture was applied in negotiations of socioeconomic status through consumption. Primary preconditions for such insights are first the understanding of different observable attributes of industry standards applied in the manufacture of pipes related directly to price differences and, secondly, a recording praxis that enables the quantification of these.

Summary

The study at hand sets out to analyse and determine industry standards of the Swedish clay tobacco pipe industry of the 18th century by juxtaposing intact clay tobacco pipes manufactured in the late 1750s recovered in 1984 to archival sources relating to the clay tobacco pipe industry. While previous research in Sweden has focused on chronometric aspects of domestically produced pipes, research from the Netherlands and England, both significant pipe producing countries,

has shown that understanding and recording variations in production quality and types can make variations in consumption behaviors in the past more salient. Drawing on social practice theory, it is argued that clay tobacco pipes of different types, i.e. lengths and qualities, can be understood as material elements used in smoking practices referred to as smokeways. Smokeways as a heuristic concept is to be understood as variations in smoking practices that, in turn, can be interpreted as employed in negotiations of social status.

A basic assumption of the study is that different social groups practised, or were at least expected to practice, different smokeways in the past. These were linked to notions of a necessity for recognisability of social status that upheld social distinction through variations in consumption practices. The aim of the study is therefore to identify diagnostic and recordable attributes of clay tobacco pipes of different price categories to provide an empirical basis applicable in a post-excavation recording praxis that considers how pipes were applied beyond their function as instruments of tobacco consumption.

The study is source pluralistic as it combines analyses of intact pipes known to have been manufactured at the clay tobacco pipe factory that belonged to Olof Forsberg in Stockholm to archival information relating to the clay tobacco pipe manufacturing industry in 18th century Sweden. Among these are type and price information from Forsberg's and other factories, a manufacturing description and an advertisement from the pipe factory in Alingsås.

Intact pipes in the Forsberg assemblage, consisting of a bowl, a stem, and a mouthpiece, have been coupled to named types in a previously unknown price list from the factory where they were made. Measurements of stem lengths of identified Forsberg pipes are compared to stem lengths known from an advertisement and prices known from the Alingsås clay tobacco pipe factory. Visible attributes related to production quality and relative price known from a manufacturing description from the same factory are also considered. Among these are signs of polishing or a lack thereof and relative stem straightness resulting from variations in manufacturing procedures. Names and prices of pipes known from other contemporaneous factories are then compared to these.

The combination of sources shows that there was a seemingly shared and generally standardised modus operandi for the Swedish clay tobacco pipe industry of 18th century. The most expensive pipes were generally longer and had relatively straight stems and polished surfaces, while the least expensive pipes more often had warped stems and had been trimmed from mould flashes and occasionally smoothened. These differences are also mirrored by price information from all currently known archival sources relating to the contemporaneous clay tobacco pipe industry. This comparison shows that variations in the production output were relatively similar between makers, thus providing consumers with recognisable and generally standardised variations applicable in differentiating smokeways. The results strongly suggest that if price is believed to be a factor to consider for analyses of the socioeconomic status of smokers via smokeways, pipe fragments have the potential to be considered as tangible material representations of notions of recognisability. As these variations in production methods related to price are the results of mutually shared industry standards and remain observable on pipe fragments recovered from the archaeological record, there is as much validity to considering and recording such attributes of Swedish pipes as there is for their Dutch and English counterparts.

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Några frågor till ett massmaterial och upptäckten av en varvsplats. En glimt av Sigtunas maritima medeltid

Af Rune Edberg

Inledning

Sigtuna är Sveriges äldsta stad, inom landets medeltida gränser. Omkring år 1000 anlades där Olof Skötkonungs kungsgård med Sveriges första myntverk. Staden fick successivt tomtindelning med bostäder, hantverkare och handelsbodar. Runt bebyggelsen stakades kristna begravningsplatser ut (Tesch 2008).

En växande befolkning behövde försörjas med mat, bränsle och mycket annat. Eftersom människor är människor, då som nu, kan man med hjälp av historiska analogier beräkna vilka ungefärliga mängder som gick åt. Varje stadsbo behövde minst 1 kg livsmedel om dagen och för uppvärmning slukade varje hushåll eller verkstad minst 20 m^3 ved per år. Räknat på tänkta 500 invånare blir det ca 180 ton livsmedel och på 50 byggnader ca 1 000 m^3 ved (Edberg 2007 med där anförda källor).

Staden ligger vid Mälaren, omgiven av under järnåldern fullt koloniserade jordbruksbygder. Levererades t.ex. all den skrymmande veden med mindre båtar, som lastade t.ex. måttliga 2 m^3, krävdes under seglationssäsongen två båtanlöp per dag för att täcka stadens årliga behov. Från staden hem till gårdarna kan bönderna ha skeppat latrin, ett begärligt högvärdigt gödsel, att sprida ut på åkrarna. För tänkta 500 invånare kan beräknas, också med hjälp av historiska analogier, ha avbördat sig 25 ton sådan, i fast form, per år (Dahlberg & Johansson 1941: 591 ff.). Kanske också vedaska från staden tillvaratagits som gödning? Stadshushållen hade säkert också egna båtar för resor, fiske och andra behov.

Denna tidiga sjöfart på Mälaren mellan stad och omland kan med andra ord ha varit intensiv. Och om man vet var man ska söka kan man ännu i dag hitta spåren. På grund av landhöjningen är Sigtunas strandlinje nu 4–5 m lägre än för 1000 år sedan. Det återvunna området har successivt blivit bebyggt och därmed skapat förutsättningar för ett slags underjordisk marinarkeologi.

Vardagligt massmaterial

Grävningar i staden inleddes för över hundra år sedan och Sigtuna Museums arkeologiska samlingar är bland de största i Sverige. Guld- och silverföremål, olika slags smycken, amuletter och mycket annat av exotiskt ursprung, liksom över hundra runristade föremål, hör till de mest spektakulära och uppmärksammade fynden. Men den stora merparten är av vardagligare natur. Det är sådant som tappats eller kasserats och sedan trampats ner i jorden eller använts som utfyllnad. Det är t.ex. krukskärvor och annat trasigt lergods, spill från horn- eller metallhantverk, slagg och bränd lerklining från eldhärjade och rivna hus. Sådant som arkeologin betecknar som massmaterial.

I fyndmaterialet finns mycket gott om järnskrot vilket vid en första anblick kan verka egendomligt för i äldre tid krävde järnföremål mycket arbete i många olika led. De kan inte ha varit billiga. Varför har skrot lämnats att rosta bort i jorden, vilket skett i Sigtuna ända från stadens äldsta tid? Det är ett faktum att det var först på 1800-talet som uppfinningar gjorde det möjligt att återanvända skrot vid järnframställning. Att smida om trasiga spikar, nitar och andra små begagnade föremål av järn i någon större omfattning har aldrig varit praktiskt genomförbart. Förklaringen är alltså att skrotjärnet med avsikt har lämnats där det föll, eftersom det blivit värdelöst.

Sigtunas vikingatida och medeltida kulturlager omfattar ca 10 ha med en beräknad genomsnittlig mäktighet på 0,5 m vilket motsvarar ca 50 000 m^3 jord (sentida schaktningar och liknande ingrepp har inte beaktats). Vid de arkeologiska undersökningarna i staden har genomsnittligt och i runda tal registrerats 1/3 kg järn per m^3 genomgången jord. Detta innebär drygt 15 ton arkeologiskt järn. Indirekt vittnar fyndrikedomen också om en omfattande järnproduktion i omlandet, men detta är en annan historia. Som jämförelse finns i genomsnitt och runda tal ungefär 1/2 kg keramik per m^3 jord. Mängden arkeologisk keramik blir, uppskattad på samma sätt, ca 25 ton.

Nitförband med mening

Som forskningsobjekt verkar själva omfattningen överväldigande eller avskräckande. Strikt avgränsade frågeställningar är därför mer än någonsin en väg till framgång. Även om man ibland träffar på urskiljbara föremål så består den stora delen av järnskrotet av smärre eller större fragment, ofta hoprostade med varandra, med stenar och annat till oformliga klumpar eller konglomerat. Men i Sigtuna finns trots allt en speciell kategori som går att skilja ut och som det visar sig gå att få fram meningsfull kunskap ur, nämligen nitförbanden. Att kasserade nitförband hamnat i jorden beror givetvis på att de som allt annat skrotjärn varit

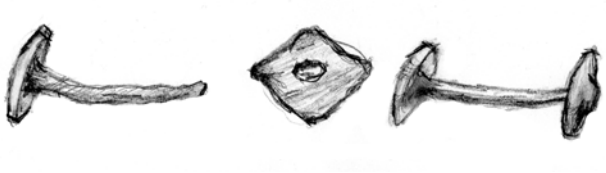

Fig. 1 Föreslagen terminologi på svenska, engelska och tyska. Från vänster: Nit (rivet, Niet) • Bricka, nitbricka (rove, Nietplatte) • Nitförband (clench bolt, Nietenverbindung).
Suggested terms for rivet, rove, and clench bolt in Swedish, English, and German.

oanvändbara. Men vad betyder själva förekomsten i stor omfattning av detta slags föremål?

Ett nitförband är ett spikliknande föremål – en nit – med en stor skalle i ena ändan och en kvadratisk eller rombisk bricka i den andra (fig. 1). Förbandet har skapats genom att niten satts in i ett förborrat hål i två överlappande trästycken. Brickan har sedan pressats fast hårt på motsatt sida och sedan har nitspetsen knipsats av och hamrats fast, stukats, över brickan. Att öppna ett nitförband går inte, utan det måste brytas upp genom att skallen, brickan eller stjälken slås av (Lundström 1973; se nedan om fyndet av en så kallad spiksökare). Även om nitförband ibland har använts i vissa snickeriarbeten så är det i båtar i den klinkbyggda traditionen som de förekommit i stor omfattning. De är karaktäristiska fynd eller ledartefakter för båtar och skepp. Otaliga och välkända exempel från hela Skandinavien illustrerar detta. För övrigt är forskningsterminologin kring nitar och nitförband på många språk hopplöst förvirrad, vilket i hög grad försvårar jämförelser (Edberg 2011a: 13–14; 2012; Zori 2007).

Bevaringsförhållandena för trävirke är i Sigtuna generellt sett dåliga. Men ett litet antal fragment av båtbord, med nitförband fastsittande *in situ*, har ändå överlevt och påträffats arkeologiskt. Sju exempel är från 1000-talet, stadens äldsta tid (fig. 2). Endast ett senare fynd, från 1100-talets andra hälft, är bevarat och det tack vare att ytveden är kraftigt svedd. Träslaget är i alla fallen ek. Ett särskilt fall är de bitar av bordläggning från en båt som låg som golv i en grav från 1000-talets början. Virket var bortruttnat men två rader bevarade nitförband skvallrade om hur båten varit byggd (Edberg 2011a; 2011b; 2012; 2023; Hed Jakobsson *et al*. 2017).

Fig. 2 Nitförband in situ på båtbord i ek från Sigtunas kulturlager. Kv. Professorn 1, fynd nr . 11629 (fas 8, ca 1040–1055). Foto Sigtuna Museum
Clench bolt in situ in oak boat planking. Kv. Professorn 1, find no. 11629 (phase 8 c. AD 1040–1055).

Okonserverat eller bortkastat

Om båtdelar i trä med nitar i ursprungligt läge således sällan påträffas i kulturlagren så finns lösa nitförband i mycket stora mängder. Kompletta nitförband vittnar om båtvrak eller kasserade delar av bordläggning. Nitförbandens inre mått visar bordläggningens dimensioner. Avklippta nitar, liksom bortslagna nitskallar och nitbrickor, berättar i sin tur om upphuggning och reparationer. De är i hög grad manifesta spår av en kontinuerligt pågående varvsverksamhet i staden.

Arkeologiskt järn är notoriskt besvärligt att undersöka i synnerhet som det sällan finns medel till konservering. Nedbrytningen fortsätter då i museimagasinet, där järnet sakta övergått till att bli rostpulver. När konserveringsbudget saknas tillvaratas för övrigt numera ofta inte järnskrot, utan kastas, vilket också drabbat en del fynd från Sigtunagrävningar. Bortfallet i källmaterialet är därför av dessa olika anledningar mycket stort, men trots allt har det visat sig ännu finnas rätt många föremål som i någon mån har form och struktur i behåll och som kan studeras.

I min forskning har jag identifierat och undersökt över 1000 nitförband från olika fyndlokaler i Sigtuna. Tack vare att de största stadsundersökningarna mellan 1998 och 2006 omsider nu analyserats och publicerats som rapporter, kan en stor andel fynd också knytas till sammanhang och tid. Trämaterial i de äldsta lagren i kv. Professorn 1 var för Sigtunaförhållanden välbevarat och det är därifrån sex av de åtta ovan nämnda bordfynden med nitförband kommer (Wikström

Fig. 3 Exempel på okonserverade nitförband och nitbrickor från kv. Professorn 1, Sigtuna.
• Vänstra raden, uppifrån: fynd nr. 38437, fas 12 (ca 1105–1130); fynd nr. 29530, fas 12 (ca 1105–1130); fynd nr. 34978, fas 8 (ca 1040–1055).
• Mellanraden, uppifrån: fynd nr. 43618, fas 20 (ca 1500-tal–nutid); fynd nr. 46545, fas 12 (ca 1105–1130); fynd nr. 36061, fas 6 (ca 1015–1030).
• Högra raden, uppifrån: fynd nr. 44256, fas 8 (ca 1040–1055); fynd nr. 42078, fas 5 (ca 985–991): fynd nr. 42044, fas 5; fynd nr. 40058 (bricka) fas 4 (ca 900–1000); fynd nr. 41040 (bricka) fas 5 (ca 985–991). Foto författaren.
Some non-stabilized clench bolts and roves from the Professorn 1 site, Sigtuna.

et al. 2021). De övriga två är från kv. Trädgårdsmästaren 9–10 (Wikström 2011).

Mätbara innermått

Jag gjorde nyligen en genomgång av det järn som tillvaratagits från kv. Professorn 1, och kunde identifiera 262 nitförband som var i sådant skick att innermåtten var möjliga att mäta med rimlig noggrannhet. Medel- och medianmått visade sig vara 25 mm. Flest nitförband fanns i denna grävnings fas 8 (1040–1055). Det fanns också 127 lösa nitbrickor, med eller utan kvarsittande delar av avknipsade nitdelar (fig. 3). Också de hade en topp i fas 8 med 25 exemplar (fig. 4) (Edberg 2023). Det genomsnittliga nitmåttet, 25 mm, från kv. Professorn 1 kan jämföras med motsvarande från andra fyndlokaler, som jag tidigare gått igenom och publicerat. Det stämde helt med måttet från kv. Humlegården 3 (med 95 studerade exemplar). Däremot var det en smula mindre än motsvarigheten i kv. Trädgårdsmästaren 9–10 (575 exemplar) där medelmåttet var 28 mm (Edberg 2011a, 2012, 2013).

I kv. Professorn 1 tillhör 55 % av nitförbanden tiden före ca 1100 (denna grävnings fas 1–11) och 30 % tiden ca 1100–1280 (fas 12–16). I kv. Trädgårdsmästaren 9–10 tillhör 30 % av nitförbanden tiden före ca 1100 (denna grävnings fas 1–5) medan 67 % dateras till ca 1100–1270 (fas

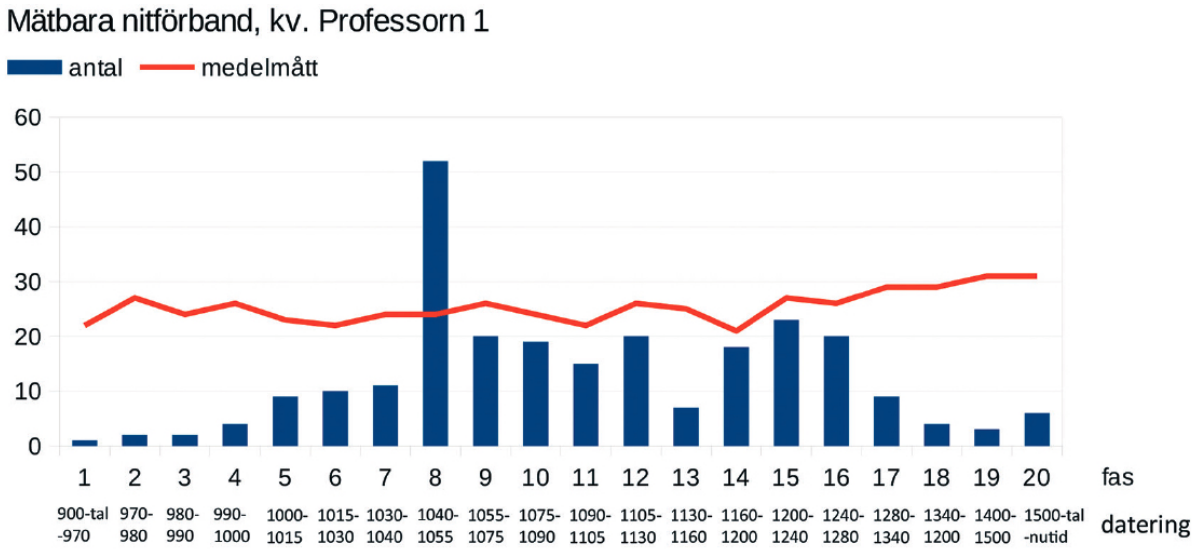

Fig. 4 Det totala antalet mätbara nitförband i kv. Professorn 1, Sigtuna, var 262. Medelmåttet, taget från skallens undersida till brickans översida, var 25 mm.
From Sigtuna's Professorn 1 site, 262 clench bolts were measured. The average distance from the head's underside to the rove's top side was 25 mm.

6–10). Beror skillnaden på att nitförbanden från kv. Trädgårdsmästaren 9–10 alltså har en senare kronologisk tyngdpunkt? Blev båtarna över tid generellt större? Det hade varit en tilltalande förklaring men måttskillnaden mellan de två lokalerna, om än marginell, består i alla faser. En tendens till förekomst av större båtar kan anas vid den strandnära lokalen kv. Professorn 4, där de 102 mätbara exemplaren uppvisar ett genomsnitt på 31 mm. De stratigrafiska dateringarna är här relativt svaga, men den stora merparten av föremålen kan föras till 1200-talet eller senare (Edberg 2011a; 2012; 2014).

Måttligt stora båtar

Trots vissa olikheter mellan undersökta fyndlokaler ligger nitförbandens innermått överallt, både i medeltal och som median, på mellan 25 och 28 mm. Innermåtten representerar således två båtbord liggande omlott och motsvarar en virkestjocklek på 12,5 till 14 mm. (Det finns givetvis i alla båtar i klinkbyggd tradition både kortare nitar som t.ex. lasknitar och längre som t.ex. spanttoppsnitar, men i en översiktlig beräkning kan dessa längdmässigt antas i stort sett ta ut varandra.) Detta mått stämmer t.ex. väl med de genomsnittliga nitförbandsmåtten hos de ca 9 m långa gravbåtarna Valsgärde 12 och 15, från 900-talets andra del, vilka var 25–26 mm (Virtanen 1983). Borden på den ca 8 m långa gravbåten Valsgärde 1, från 1000-talets första del, mätte ca 15 mm (Fridell 1930). En översikt av Valsgärdefynden med exempel finns också hos Larsson (2007: 89–90). Att det är båtar i denna storleksordning som syns i Sigtunas fyndmaterial verkar vara klart. Men samtidigt som nitförbanden ger en god indikation på båtars storlek är det emellertid inte möjligt att enbart utifrån dem uttala sig om den variation av båttyper som får förutsättas ha existerat.

När det gäller detta slags källmaterial redovisar arkeologiska rapporter inte ofta påträffade nitförband i detalj, och när det ändå förekommer, anges sällan det inre måttet. Noggranna jämförelser mellan olika fyndlokaler kan därför inte komma ifråga. Men att den bordläggning, som vid ungefär samma tid, men på annat håll, använts vid bygget av båtar för Östersjöfart var kraftigare får ses som vetenskapligt allmängods. För att ta ett exempel ur mängden var den 22 m långa Ladbybåten byggd med 20–25 mm tjocka bord (Thorvildsen 1959: 36). Och för att ta ett annat hade den (minst) 16 m långa båten i kammargraven från Hedeby ca 25 mm tjocka bord (Müller-Wille 1976: 17–28). För övrigt finns en parallell till undersökningarna i Sigtuna just från Hedeby. En genomgång av nitförband från platsens kulturlager, närmare 700

Fig. 5 ”Spiksökare” från kv. S:t Gertrud 3, Sigtuna. Fynd nr. 332. Längd 90 mm. 1000-talet Används vid reparationer för att slå bort nitförband på bord som ska ersättas. Foto Sigtuna Museum.
”Cats' paw” from the S:t Gertrud 3 site, Sigtuna, 11th century. This tool is used to cut off clench bolts in boat repair work.

Fig. 6 Remsa med nitbrickor, kv. Professorn 4, Sigtuna. Fynd nr. 3438. 1200-talet. Vid montering av båtbord pressas brickan fast på niten och bildar ett nitförband. Foto Sigtuna Museum.
Strip of roves, Professorn 4 site, Sigtuna. 13th century. In boat building and repair, the rove is forced on the rivet, constituting the clench bolt.

exemplar, visade ett medelmått på 44 mm, motsvarande en bordtjocklek på 22 mm (Westphalen 2002: 203 ff.).

Båtar till försäljning

Sigtunas nitförband härrör till övervägande del från 900-talets slut till 1200-talets slut. De är rester av klinkbyggda båtar av måttlig storlek som kontinuerligt århundrade efter århundrade svarar för nyttotrafiken på Mälaren. Självklart både rodde och seglade man: från kulturlagren finns också fynd av åror, årtullar (håar) och sådana mastrackar, som används vid råsegelsriggar (Edberg 2011b; 2012; 2013).

Båtarna i trafiken på Sigtuna har säkert byggts både ute på gårdarna i omlandet och i staden. Men det är rimligt att anta att det analogt med det specialiserade hantverk, på vilket det finns många arkeologiska exempel av olika slag, också funnits verkstäder som inte enbart erbjudit tjänster för reparationer och underhåll utan också byggt båtar på beställning och till försäljning till kunder i staden och omlandet. Båtar, som kan förmodas ha stått på en högre teknisk nivå än böndernas hembyggen. Ett typiskt verktyg, en kofotsliknande så kallad spiksökare, finns bland fynden (fig. 5). Detta slags verktyg uppmärksammades mig veterligt för första gången antikvariskt av Per Lundström vid undersökningen av Pavikenlokalen på Gotland. Hans uppfattning var att det kunde användas efter det att man först lösgjort nitarna med en mejsel. Lundström påvisade sentida paralleller (1973). Bland Sigtunafynden finns också smidda remsor med nitbrickor, färdiga att användas (fig. 6) (Jfr Edberg 2012; 2013.)

Två fynd av ankaren, varav ett mycket välbevarat och tidigare publicerat (Edberg 2011c), och ett andra, kraftigt upprostat (fig. 7) indikerar att också stora skepp anlöpt Sigtuna. Det första kan sannolikt, det andra tämligen säkert, stratigrafiskt placeras i 1000-talet. Vid denna tid representerade ankaren den högsta rangens smideskonst, var stora dyrbarheter och förbehållna kungars och stormäns finaste skepp. De är mycket sällsynta som arkeologiska fynd (Edberg 2007; 2011c; 2014). Att vikingatida långskepp förekommit också på Mälaren är följdriktigt. Från runstenar känner vi till att bygdehövdingar rustade skepp

Fig. 7 Ett kraftigt upprostat ankare från ett 1000-talslager i kv. Professorn 4, Sigtuna, under utgrävning 1996. Fynd nr. 5441. Längd 110 cm, bredd 75 cm. Foto författaren.
An anchor, almost totally destroyed by rust, during excavation at the Professorn 4 site, Sigtuna, in 1996. 11th century.

för utlandsfärder och att vikingatida kungar kommit sjövägen till Sigtuna nämns i kungasagor och skaldediktning. Vid slaget vid Svolder, år 1000, deltog Olof Skötkonung med ett stort antal skepp. Också bland nitförbanden kan det finnas spår av detta slags skepp, fast de med den hittills tillämpade översiktliga metodiken inte kunnat särskiljas.

Viktig varvsplats

Finns då inte chansen att finna båtar och skepp på sjöbottnen vid Sigtuna? Det gör det säkert för rent allmänt finns vrak från alla tider på Mälarens botten. Ett annat rimligt antagande är att en hamn med större djup och bättre lä funnits på ett annat ställe än precis nedanför den centrala stadsbebyggelsen, där det är långgrunt och oskyddat från de flesta vindriktningar. Med andra ord en plats lämpligare för sådana båtar och skepp, som inte utan vidare kan dras upp på stranden. Möjliga lägen i stadens omedelbara närhet finns t.ex. vid Munkholmen. Ett på 1600-talet noterat namn på denna är Skeppsholmen (Gihl 1925). För övrigt har en batymetrisk undersökning utförd på kommunens uppdrag av företaget Marin Mätteknik påvisat flera vrak intill bron över Garnsviken, det forna Tilesundet, strax öster om staden (Edberg 2012 med referens). Detta slags forskning, alltså traditionell ”våt” marinarkeologi, är för Sigtunas del ännu i stort sett oprövad.

Sett till helheten så påvisar arkeologin hur livet i det tidiga Sigtuna kännetecknades av nära interaktion och förbindelser mellan stad och land genom sjökommunikation. Speciellt kan understrykas att antalet bevarade nitförband är mycket stort och att detta är vittnesbörd om storskaligt båtbyggeri, reparationer och upphuggning av båtar i klinkbyggd tradition. Sigtuna framstår, också i skandinaviskt perspektiv, som en viktig varvsplats under sen vikingatid–tidig medeltid.

Slutligen kan påpekas att massmaterialet från Sigtuna, och givetvis från också andra liknande fyndlokaler där större undersökningar med modern stratigrafisk metodik genomförts, bör kunna lämpa sig för ännu mer detaljerade undersökningar, gärna med hjälp av statistiska metoder.

Summary

Some questions for a mass material and the discovery of a shipyard site. A glimpse of Sigtuna's maritime Middle Ages
The occupation layers of Sigtuna, Sweden's oldest town within the country's medieval borders, contain at least 15 tons of iron scrap. This illus-

trates the fact that it was not until the 19th century that inventions allowed for the reuse of scrapped iron in iron production. Among iron artefacts, the large numbers of clench bolts stand out. I have identified and examined over 1000 of these. The mean inner size of the clench bolts overall falls between 25 and 28 mm. This represents the sum of two overlapping planks and thus corresponds to a plank thickness of 12.5 to 14 mm. The clench bolts represent the boats plying to and fro Sigtuna and its farming hinterland providing the townspeople with food, fodder and firebrand. It may be calculated that 500 people need c. 180 tons of food a year, and 100 households or workshops need 1000 m^3 of firewood a year. The clench bolts from Sigtuna belonged, it is obvious, to a type of clinker-built boat of modest size which continually, century after century, serviced Lake Mälaren. It may be assumed that the town craftsmen included specialists who not only offered their services for repairs and maintenance but also built boats to order and for sale. A specialist nail-pulling tool, known as a "cat's paw", occurs among the finds from Sigtuna. This, as well as strips of rove plates, is evidence of repairs and bolting work. In Scandinavia, Sigtuna stands out as an important boat-building, repairing and scrapping site from the late Viking and Early Medieval periods.

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Byrummet under Rådhuspladsen – en digital videnspulje for geologi og kulturarv

Af Niels Henrik Andreasen og Tina Rasmussen

Fig. 1. Udsnit af 3D-modellen med et kig mod Vesterport og byen i år 1762. © Københavns Museum og Geo.
Section of the 3D model with a view towards Vesterport and the city in the year 1762.

En test af potentiale og gennemførlighed af et fagligt og formidlingsmæssigt 3D-projekt

Projektet 'Byrummet under Rådhuspladsen' er et pilotinitiativ, der udspringer af et større projekt om Københavns historie, formidlet gennem 3D-modeller.**1** I centrum for projektet er en fælles digital platform til videnssøgning, som muliggør en langt mere tilgængelig og intuitiv formidling af kulturhistoriske værdier end hidtil. Dette danner et helt nyt fundament for at udforske, undersøge og besvare spørgsmål om det underjordiske byrum.

Projektet er både tværfagligt og tværinstitutionelt og er et resultat af samarbejdet mellem kulturhistorikere og geologer. Pilotprojektet er blevet udviklet i tæt samarbejde mellem Københavns Museum og den erhvervsdrivende fond, Geo. Alexandra Instituttet har haft ansvaret for navigationen og visualiseringen af 3D-modellen, mens Københavns Stadsarkiv har integreret modellen på deres platform, hvor modellen kan opleves via kbhbilleder.dk eller gennem det direkte link: https://bur.geo.dk/.

3D-modellen er udviklet som et værktøj til at visualisere og formidle fortidsminder, der ellers kan være vanskelige eller umulige at opleve i byrummet. Med udgangspunkt i arkæologisk og geologisk viden leverer modellen en detaljeret gengivelse af en række fortidsminder, hvilket gør det muligt for brugeren at opleve og forstå deres udseende og placering i byen (fig. 1). Dette er særlig værdifuldt for jorddækkede fortidsminder, da de er særligt sårbare over for anlægsarbejde og kan være vanskelige at forstå. Modellen bygger både på data fra undergrunden og på arkivalske oplysninger om nu forsvundne bygninger over jordoverfladen. Dette skaber en omfattende model, der giver det optimale grundlag for at forstå, hvordan byen tidligere har set ud. 3D-modellen tjener som et værktøj, der både beskytter og formidler kulturarven ved at bevare og oplyse om den.

Pilotprojektet har til formål at udforske potentialet og mulighederne for at gennemføre et større hovedprojekt. Dette hovedprojekt vil omfatte både en faglig og en formidlingsmæssig del, som vil blive illustreret ved hjælp af 3D-modeller af kommunerne København og Frederiksberg. Målet med pilotprojektet er at vise, hvordan arkæologiske og geologiske grunddata kan omdannes til et tredimensionelt produkt. Dette produkt skal medvirke til at give en dybere forståelse af byens historiske udseende og udvikling.

Baggrunden for projektet

København er præget af en rig arkæologisk arv, med dybe kulturlag, der strækker sig over 1.000 år, gemt under byens overflade. Samtidig står byen over for betydelige udfordringer forårsaget af moderne byudvikling, der ofte indebærer modstridende krav og dynamikker. Efterspørgslen efter bæredygtig byudvikling intensiverer byens fortætning og kan bringe arkæologisk værdifulde områder i fare. Denne udvikling fører ofte til, at gamle bygninger rives ned, mens nye og større konstruktioner opføres, og tidligere åbne

områder, især langs havnefronten, inddrages. At finde en balance mellem byudvikling og bevarelse af kulturarv er en kompleks udfordring, som kræver omhyggelig planlægning og hensyn til de mange arkæologiske fund og fortidsminder.

På grund af den øgede graveaktivitet er det blevet afgørende for arkæologien at fokusere på at bevare så meget information som muligt om vores kulturarv, før den går tabt. For at opnå dette er der behov for en forbedret oversigt og sammenstilling af tidligere undersøgte data om fortidsminderne. De bygherrebetalte arkæologiske undersøgelser producerer hvert år en betydelig mængde data. Disse data er afgørende for vores forståelse af byens historiske udvikling, funderingsforhold og kulturhistoriske værdier. På samme måde som arkæologer arbejder geologer med undergrundsdata for at få en bedre indsigt i jordens sammensætning, hvilket er essentielt inden byggeriets start.

Projektet "Byrummet under Rådhuspladsen" anvender en tværfaglig tilgang ved at integrere viden om både geologiske forhold og menneskeskabte fyldlag og strukturer. De indsamlede data kaster lys over områdets kulturhistoriske interesser og kortlægger disse, hvilket er afgørende for at imødekomme behovene hos arkæologer og andre relevante interessenter, der søger indsigt i området. Ved at anvende digitale kort eller 3D-modeller, som kan opdateres løbende, sigter projektet mod at skabe et bredere og mere detaljeret overblik. Gennem samarbejde mellem museale myndigheder, politikere, byplanlæggere og anlægsbranchen kan dette overblik føre til mere effektiv planlægning og bedre anlægsprojekter, der i størst muligt omfang bevarer den arkæologiske kulturarv.

Det aktuelle digitale projekt tager udgangspunkt i byens behov for at fremme brugen og udbredelsen af nyttige digitale værktøjer. Pilotprojektet er et tværfagligt initiativ, hvor der er udviklet en digital 3D-model af området omkring Rådhuspladsen i København. Ved at gøre denne del af byens udvikling tilgængelig på en letforståelig måde får borgerne mulighed for at få en enestående indsigt i Rådhuspladsens skjulte strukturer og historiske lag. På et fagligt niveau, som vil blive yderligere udforsket i et større projekt, fokuseres der på at samle den arkæologiske viden samt resultaterne fra mange års arkæologiske undersøgelser i hovedstaden. Ved at kombinere disse oplysninger med geologiske data skabes der en effektiv forbindelse mellem digitalisering og praktiske løsninger i hverdagen. De løbende og betydelige bidrag til den arkæologiske vidensbank understreger vigtigheden af at revurdere tidligere fund og data for at få en dybere forståelse af byens udvikling. Selvom der er udfordringer forbundet med brugen af ældre data, gemmer disse materialer på et stort potentiale til at frembringe nye resultater og indsigter.

Metode og baggrundsdata

Projektet gennemfører en omfattende kortlægning af kulturhistoriske, geologiske og geotekniske data fra et område på 85.500 m² omkring Rådhuspladsen i hjertet af København. Ud over Rådhuspladsen og de nærliggende ejendomme omfatter projektet også en del af middelalderbyen via Frederiksberggade/Strøget, samt området syd for Rådhuset ned til Københavns Museum i Stormgade. Projektområdet inkluderer derfor den tidligere kystlinje og havnefront mod syd, landskabet foran de historiske forsvarsværker mod vest samt den urbane bebyggelse i de centrale, nordøstlige og østlige dele. Dette giver mulighed for at indsamle en bred vifte af data fra et centralt og historisk vigtigt område i København.

De nuværende data om Københavns underjordiske rum er generelt spredte og svære at tilgå. Det kræver betydelige ressourcer at indsamle og sammenstille disse data, som er fordelt på forskellige aktører og platforme og ofte foreligger i forskellige formater. Selvom det kan være udfordrende at arbejde med gamle data, ligger der et stort potentiale i at udnytte dem til at opnå nye resultater og indsigter. Siden starten af det nuværende pilotprojekt har vores mål været at gøre data og viden om byens undergrund mere brugervenlig og tilgængelig. Målet er at fremme gennemsigtighed og muliggøre borgerinddragelse.

Som resultat af projektets databehandling og digitalisering er der udviklet en omfattende model, der er opdelt i to dele: en geologisk terrænmodel og en digital 3D-model, der skildrer de menneskeskabte strukturer og bygninger. Disse modeller repræsenterer vores bedste bud på byens udvikling i fire forskellige tidsperioder, lige fra menneskets tidligste aktiviteter, gennem middelalderen og frem til 1762. Samlet set tilbyder modellen et detaljeret indblik i byens fysiske udvikling set både fra et geologisk og arkæologisk perspektiv (fig. 2).

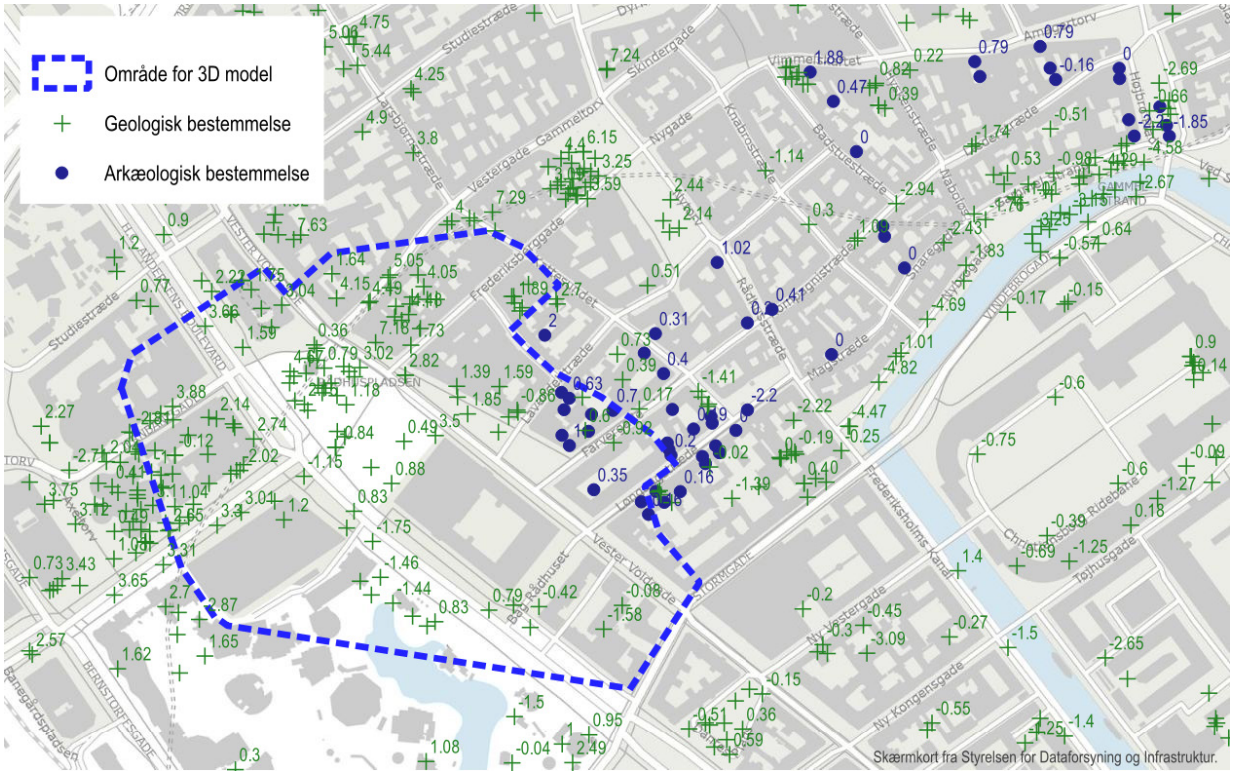

Fig. 2. Oversigt over de arkæologiske og geologiske data, der identificerer de øverste lag af de naturlige aflejringer, der anvendes til at fastlægge det oprindelige landskab omkring den københavnske kystlinje. De geologiske data er blevet indsamlet fra 1.090 ældre boringer, udført i og omkring projektområdet. © Københavns Museum og Geo.
Overview of the archaeological and geological data that identifies the top layers of the natural deposits used for mapping the original landscape along the Copenhagen coastline. The geological data has been collected from 1,090 older boreholes conducted in and around the project area.

Geologiske data
Projektets hovedformål er at genskabe byens oprindelige landskab fra før den urbane udvikling samt at dokumentere de historiske forandringer i byens landskab gennem tiden. Da det oprindelige terræn nu er skjult under nutidens gadeniveau, kræver denne genskabelse en grundig undersøgelse af jordlagene. Det oprindelige terræn betegnes som det skel, der adskiller de naturlige jordaflejringer fra de spor, menneskelig aktivitet har efterladt i jorden.

Arkæologerne identificerer denne grænse visuelt under deres undersøgelser, mens den geologiske bestemmelse kræver boringer, som udføres som led i forundersøgelser til byggeri eller analyser af jordforurening. Dybderne fra både de geologiske og arkæologiske undersøgelser noteres på kort, hvilket muliggør sammenligninger. Data er blevet indsamlet fra alle tilgængelige geologiske boringer i området, både fra offentlige databaser og fra Geos arkiv. I alt er data fra 1090 boringer i og omkring projektområdet blevet anvendt. Ved at kombinere disse boringer med ekstra oplysninger fra de arkæologiske registreringer skabes et sammenhængende billede af de naturlige aflejringer under overfladen. Ved at interpolere mellem tilgængelige datapunkter fra de individuelle registreringer kan hele områdets flade rekonstrueres. Dermed kan der udarbejdes et kort med højdekurver, der illustrerer overfladen af de naturlige aflejringer i projektområdet.

Arkæologiske data
Området omkring Rådhuspladsen er arkæologisk velundersøgt med omkring 100 lokaliteter, der rummer elementer fra byens tidligste historie op til nutiden. Disse omfatter byporte, voldgrave, kirkegårde og opfyldt havbund. I dette område findes både nyere veldokumenterede arkæologiske undersøgelser og ældre udgravninger med begrænsede data. Kvaliteten af de arkæologiske registreringer varierer betydeligt og spænder fra

simple feltskitser fra slutningen af 1800-tallet til avancerede digitale opmålinger i tre dimensioner, der er udført i forbindelse med udgravningerne til den nye Metro Cityring på Rådhuspladsen. For at håndtere dette meget forskelligartede datasæt er lokaliteterne blevet inddelt i fem kategorier baseret på datakvaliteten. Denne tilgang sikrer en mere nuanceret og pålidelig analyse af de arkæologiske fund i området. Under bearbejdningen er mange lokaliteter blevet kvalitativt forbedret gennem tilføjelse af supplerende oplysninger i pilotprojektet.

Under dataindsamlingsprocessen er oplysningerne blevet digitaliseret og geografisk placeret. En ensartethed opnås ved at anvende forskellige koder til at klassificere strukturelle typer og ved at angive en start- og slutdato for alle arkæologiske anlæg. Dette gør det muligt at sammenligne data på tværs af forskellige arkæologiske undersøgelser. Formålet med det kommende projekt er at bruge 3D-visualisering til at præsentere de kategoriserede baggrundsdata til faglig brug. Dette vil åbne muligheder for at anvende dataene i fortolkning og analyse af arkæologiske strukturer og se dem i sammenhæng med geologiske data, hvor tidligere terrænformer kan genskabes.

I pilotprojektet kombineres data fra mange forskellige kilder, som aldrig før er blevet systematisk samlet og digitaliseret. Dette åbner for en række faglige perspektiver og skaber nye muligheder for at udføre analyser på tværs af arkæologi, topografi og geologi. Resultatet kan give betydelige administrative og planlægningsmæssige fordele samt inspirere til forskningsmæssige anvendelser.

Visualisering i 3D-modellen

Digitale rekonstruktioner af historiske byer og deres landskaber har længe været et værdifuldt redskab inden for arkæologi, historie og beslægtede områder. Rundt om i verden anvender mange projekter digitale teknologier som 3D-modellering og virtual reality til at vække data til live. Eksempler er Oslo 1324 (https://oslo1324.no/), Rome in 3D (https://www.relivehistoryin3d.com/), som begge giver beskueren detaljerede gengivelser af, hvordan disse historiske byer kunne have set ud.

En tidlig udfordring i projektet var at kortlægge, hvordan husene og gaderne i projektområdet så ud i forskellige historiske perioder. Den model, der anvendes i projektet, visualiserer Københavns historiske bygninger ved hjælp af en bred vifte af kilder, herunder nuværende bygninger, kortbaserede rekonstruktioner, prospekter og arkæologiske fund.

De omfattende bybrande i 1700-tallet har betydet, at der er få bevarede bygninger fra tidligere perioder omkring Rådhuspladsen, med Vartov som en sjælden undtagelse. For at genskabe fire forskellige tidsperioder i modellen er der søgt inspiration i lokale byggeskikke og de skiftende stilperioder. Som forberedelse blev der udarbejdet en beskrivelse med skitser og fotografier af de formodede bygningstyper samt væsentlige arkitektoniske og kulturhistoriske træk. Baseret på denne analyse blev bygningernes eksteriør modelleret for at afspejle, hvordan de sandsynligvis så ud i de respektive perioder. Geddes detaljerede kort fra 1761 har været uvurderlige, da de viser bygningernes placering og omfang på grundene og giver en næsten tredimensionel forståelse af byen, som den fremstod i midten af 1700-tallet. For tidligere perioder er der dog større usikkerhed i modelleringerne på grund af begrænsede eller manglende kort og arkivalier, hvilket betyder, at modellerne i højere grad bygger på formodninger.

Inden for hver tidsperiode er der udvalgt et specifikt årstal. Årstallene 1130, 1620 og 1762 er således nøje udvalgt for at kunne inkludere eller udelukke bygninger og andet, der muligvis eksisterede på det pågældende tidspunkt. Ved hjælp af de arkæologiske data er der skabt tolkningslag i 2D, der viser den formodede bystruktur baseret på den samlede viden. Udformningen af tolkningslagene samt hvilke elementer der er inkluderet eller ekskluderet, er drøftet med en bred vifte af eksperter med indgående kendskab til Københavns historie. Dette sikrer, at visualiseringen så præcist som muligt repræsenterer byens struktur i de udvalgte årstal. For at give brugerne indsigt i det arkæologiske grundlag, der ligger til grund for fortolkningerne, kan et arkæologisk lag aktiveres i modellen. Dette lag viser placeringen og udbredelsen af de strukturer, der er registreret under de arkæologiske undersøgelser.

Modellering og teksturering

I pilotprojektet var den oprindeligt planlagte detaljeringsgrad en model i LOD2 (Level of Detail 2) med simple bygningsvolumener og tagflader, hvilket udgør minimumsniveauet for opgaver in-

den for planlægning, såsom byggesagsbehandling og forsyning, herunder placering, dybde, kapacitet, alder og jordbundsforhold. Det blev imidlertid hurtigt tydeligt, at der var behov for en højere detaljeringsgrad, som svarer til LOD3, med elementer som tagflader, karnapper og kviste. Dette var nødvendigt for at skabe et visuelt resultat, der effektivt kunne formidle byens karakteristiske ændringer over tid.

Strategien for modelleringen har generelt fokuseret på at skabe en så simpel 3D-model som muligt, da mange detaljer kan gøre det langsommeligt at køre modellen på digitale platforme. I stedet fokuseres der på at anvende detaljerede teksturer for at opnå en realistisk model, der fortsat kan fungere på de valgte platforme i projektet: mobiltelefon, pc og en storskærm på museet.

Det er muligt at tilknytte metadata til hvert enkelt 3D-objekt, hvilket er særlig relevant for projektet, da det muliggør skabelsen af en model, hvor informationer om de viste objekter kan formidles og tilgås. I pilotprojektet er dette aspekt endnu ikke blevet udforsket, men det kunne blive betydningsfuldt i et hovedprojekt, hvor metadata om de enkelte rekonstruktioners kildemateriale naturligt ville kunne øge modellens transparens, troværdighed og anvendelighed. I de faglige datasæt, som viser dele af det såkaldte "arkæologiske lag", er geometri og metadata kombineret. Således er der skabt en objektbaseret relationsdatabase, hvor den geometriske repræsentation af et fortidsminde er én af flere dataformer, der beskriver objektets karakteristika og egenskaber. Denne integration af geometri og metadata i 3D-bymodellen åbner op for nye muligheder inden for digital dokumentation og formidling af kulturarv i København.

Formidlingens form og hensigt

Projektets resultater formidles på to måder. Den første er en interaktiv skærmoplevelse på Københavns Museum, hvor en 3D-model af byen og terrænet vises sammen med en lang række artikler om de arkæologiske lokaliteter. Den anden tilgang er en browserbaseret løsning, som giver brugerne mulighed for at opleve modellen via deres pc eller mobiltelefon gennem Københavns Stadsarkivs hjemmeside, kbhbilleder.dk (fig. 3). Modellen illustrerer den topografiske og historiske udvikling omkring Rådhuspladsen og fremhæver perioder som stenalderen, den tidlige middelalder, renæssancen og enevælden, som har haft særlig betydning for byens vækst. Med modellen opnår man en tredimensionel oplevelse, hvor man kan udforske gadeniveauet og vælge specifikke punkter for dybere indsigt.

I vores 3D-bymodel har vi nøje afvejet balancen mellem detaljeringsgrad og formål. Modellens primære mål er at give borgerne indsigt i byens historie, så de kan udforske og lære om dens udvikling gennem tiden. Med teknologier som augmented reality og virtual reality forventes 3D-miljøer at spille en større rolle i planlægning og projektering, da både borgere og politikere i stigende grad efterspørger interaktive og realistiske oplevelser, der kan sammenlignes med moderne computerspil, hvad angår grafik. Vores pilotprojekt har ikke haft til hensigt at skabe visualiseringer på et ekstremt detaljeret niveau, da dette ville overskride de økonomiske rammer. Feedback fra brugerne viser dog, at effektiv digital formidling ikke nødvendigvis kræver de mest detaljerede modeller. Ofte kan en lavere detaljeringsgrad være tilstrækkelig, hvis visualiseringen er pædagogisk, engagerende og giver et klart, rumligt overblik over det historiske byrum. Det afgørende er at udvikle en intuitiv visuel reference, der gør det lettere for brugerne at navigere og forbinde visualiseringen med det nuværende bybillede. Formidlingen handler om at skabe forståelse og stimulere fantasien snarere end at opnå teknisk perfektion.

Bymodellen kan også kombineres med guidede ture i projektområdet, hvor brugerne via smartphones får adgang til en række kortfattede artikler med detaljeret information om de forskellige bygninger og strukturer i modellen. Dette giver mulighed for at opleve byens historiske atmosfære og arkitektur på en interaktiv og let tilgængelig måde, hvilket kan forbedre både forståelsen og værdsættelsen af byens kulturarv.

Fremtiden?

Det geografisk afgrænsede pilotprojekt, som er beskrevet her, forventes at blive efterfulgt af et større hovedprojekt. Dette hovedprojekt vil inkludere hele Københavns underjordiske byrum og kulturhistorie. Med den udvidede version af platformen i hovedprojektet vil det ikke kun være muligt at forbedre den museale planlægning og

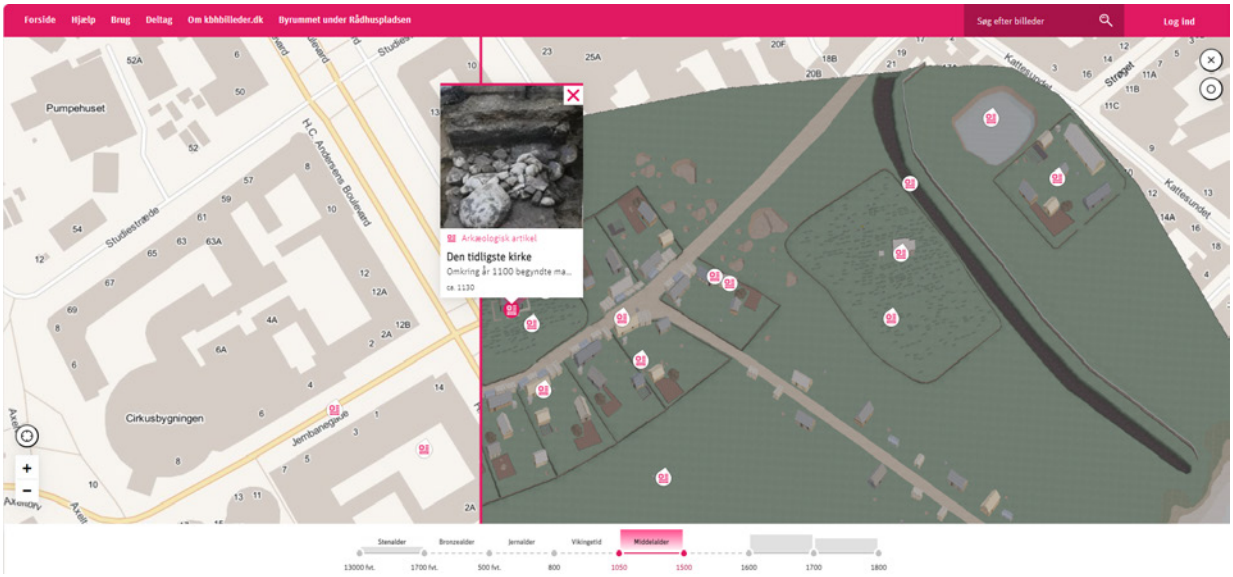

Fig. 3. Modellen fra år 1130 set via adgangen fra Kbhbilleder.dk. Her kan man i en tidslup se gennem tiden ned i de rekonstruerede bykort og få adgang til artikler og den komplette 3D-model. © Københavns Museum og Geo.
The model from the year 1130 viewed through access from Kbhbilleder.dk. Here, one can see through time into reconstructed city maps and access articles and the complete 3D model.

Fig. 4. 3D-modellen fra år 1130, der giver et indblik i, hvordan området omkring den ældste kirke ved Rådhuspladsen muligvis har set ud. Modellen inkluderer spor efter en formodet tidligere trækirke samt et senere anlagt stenfundament på kirkegården. Dertil ses der mulige markedsboder langs vejene og fragmenter af bygninger, som arkæologiske fund i området har påvist. Tallene refererer til artikler, der kan give yderligere information om de forskellige emner eller elementer. © Københavns Museum og Geo.
3D model from the year 1130, providing insight into how the area around the oldest church at City Hall Square may have looked. The model includes traces of a presumed earlier wooden church as well as a later constructed stone foundation in the cemetery. Furthermore, possible market stalls can be seen along the roads and remains of buildings that archaeological discoveries in the area have indicated. The numbers refer to articles that can provide further information on the various topics or elements.

prioritere arkæologiske undersøgelser. Det vil også støtte beslutningstagere inden for områder som undergrund, byggeri, infrastruktur og klimasikring. På denne måde kan vi sikre en mere effektiv planlægning og en bæredygtig byudvikling, der både tager hensyn til vores fælles kulturarv og optimerer arealudnyttelse samt ressourceforbrug.

Projektgruppen har en ambition om at undersøge de specifikke behov, som professionelle brugere har i forhold til 3D-visualisering og analyse af arkæologiske og geologiske data. Traditionelt har mange analyser været begrænset til todimensionelle flader, men ved at benytte tredimensionelle præsentationer kan man fremhæve arkæologiske strukturer og jordlag samt deres overlap og indbyrdes relationer på en langt mere fordelagtig måde. 3D-visualisering giver mulighed for at forstå kompleksiteten og de rumlige relationer mellem forskellige lag og strukturer, som ofte er vanskelige at formidle præcist i et todimensionelt GIS-miljø. For at opnå en dybere forståelse og udvikle en teknisk løsning, der imødekommer disse behov, planlægger projektgruppen et pilotprojekt. Dette projekt vil fokusere på at identificere de specifikke krav inden for 3D-visualisering blandt professionelle brugere og kan levere værdifuld indsigt, der vil styrke et fremtidigt storskalaprojekt.

I 2005 besluttede de europæiske lande under Europarådet at vedtage Faro-konventionen, som lægger vægt på kulturarvens betydning og borgernes tilknytning til denne arv samt de tilhørende værdier. Konventionen fremhæver betydningen af samhørighed i et samfund under forandring og understreger borgernes nye rolle inden for videns- og interessefællesskaber. Aftalens essens bliver mere og mere tydelig i den arkæologiske verden, hvor der er en stigende interesse fra offentligheden i at forme holdninger og værdier omkring kulturarv. Et tæt samarbejde med offentligheden i arkæologisk forskning og beslutningsprocesser gavner både arkæologien og bevaringen af kulturarven. Desværre får arkæologi og kulturarv ikke altid den nødvendige opmærksomhed fra byudviklere og politikere. Arkæologiens interesser står ofte svagt rent juridisk sammenlignet med andre samfundsinteresser, der får mere offentlig opmærksomhed. Offentlig deltagelse og engagement kan spille en vigtig rolle i at sikre en højere prioritering af arkæologisk kulturarv, da enkeltpersoner og interessegrupper har mulighed for at påvirke politiske beslutninger og debatter. Ved at gøre viden mere tilgængelig, inddrage borgerne i forskning og fremme engagement i arkæologiske spørgsmål og resultater kan vi lettere skabe et fælles ansvar for vores kulturarv.

Fremtidsperspektivet for hovedprojektet stemmer overens med intentionerne i Faro-konventionen. Målet er at fremme et samarbejde blandt forskellige aktører for at tackle udfordringer i det underjordiske byrum. Dette skal ske gennem innovative løsninger, der skaber værdi for både borgere og samfund.

Summary

The Urban Space Beneath the City Hall Square: A Digital Knowledge Pool for Geology and Cultural Heritage.

This paper outlines the pilot initiative, "The Urban Space Beneath the City Hall Square," dedicated to exploring Copenhagen's history through 3D models, which forms part of a larger project on the city's historical development. The key aim is to develop a novel digital platform that facilitates intuitive access to cultural historical data, permitting deeper exploration of Copenhagen's subterranean layers. The project is an interdisciplinary effort involving archaeologists, geologists, and several institutions, including the Copenhagen Museum and Geo. The Alexandra Institute and Copenhagen City Archives play distinct roles in the visualization and integration of the 3D models on accessible platforms.

A 3D model serves as an educational tool, allowing the visualization of archaeology and historically significant relics that are generally hidden or challenging to understand due to urban development and the city's geological complexities. The project synthesizes geological and archaeological data with historical records to create a comprehensive representation of Copenhagen's past landscape and structures—extending from archaeological layers below ground to historic structures above.

By exploring the project's pilot phase, the paper hints at a prospective full-scale project encompassing Copenhagen and Frederiksberg to expand on both academic and public education fronts. The initiative aligns with broader aims of sustainable urban development, seeking to balance progression with heritage preservation.

The digital tool derived from this project illustrates potential innovative applications of digital technology in archaeological preservation by improving data accessibility and enhancing public engagement through intuitive and interactive platforms. This effort supports the broader European narrative under the Faro Convention, which cherishes the role of cultural heritage and public participation in preserving shared histories.

Notes

1 Modellerne er udviklet i Revit og efterbehandlet i Blender. Revit er et softwareprogram, som gør det muligt at integrere og opdatere data i en samlet model. Revit bruges af en bred vifte af fagfolk, herunder arkitekter, strukturingeniører og bygningskonstruktører, for at skabe mere præcise og koordinerede projekter. Blender er et open source-program, der anvendes til 3D-modellering, animation, rendering og teksturering.

Kortlægning af danske købstæders historiske topografi – GIS-integration af historiske kort, brandtaksationer, 1682-grundtaksten samt ældre skattelister og jordebøger

Af Morten Søvsø

Historisk-topografiske studier af købstæder i Danmark

Kulturhistoriske studier, hvis sigte er at genskabe ældre forhold gennem kortlægninger, er en disciplin omtrent så gammel som kartografien i sig selv. I denne artikel præsenteres kun et kortfattet overblik over disciplinens forskningshistorie, der primært har udfoldet sig inden for fagområderne historie og kulturgeografi, og indtil videre kun i ret begrænset omfang fundet anvendelse i byarkæologiske sammenhænge.

Blandt de velkendte ældre arbejder kan nævnes Johannes Mejers historiske kort fra midten af 1600-årene, som trods grundig og sønderlemmende kritik spiller en genkommende rolle også i nutidens historiske arbejder (Lauridsen 1888: 332ff). For Ribes vedkommende optræder det ældste kort, som rekonstruerer ældre forhold i byen, i P.N. Thorups afsluttende artikel *Efterretninger angaaende Byen Ribe* (Thorup 1839).

Også hvad angår rekonstruktion af tidligere tiders grundstykker og ejerforhold i danske købstæder foreligger der en række tidligere arbejder udført med analoge metoder. Her udgør H.U. Ramsings arbejder om *Københavns Ejendomme* 1377-1728 et af de tidlige eksempler og viser, at det med tilstrækkelig vilje er muligt at arbejde sig igennem også landets største købstad, selv om forfatteren ikke nåede at se hele sit værk udgivet (Ramsing 1943; 1945).

Et andet skelsættende arbejde inden for samme forskningsfelt, baseret på det store materiale fra Ribe, gennemførtes af Ole Degn. Her lå fokus på tidsrummet 1560-1660, hvor kildernes omfang og kvalitet muliggør meget nøjagtige rekonstruktioner af både byens topografiske udformning, demografi og sociale forhold (Degn 1981; 1983; 1985). Degn kunne tage udgangspunkt i Ribe-historikeren Jacob F. Kinchs forarbejder, og man kunne ønske sig, at de begge havde haft nutidens GIS-systemer til deres rådighed (Kinch 1869; 1884).

Med udbredelsen af digitale GIS-systemer fra omkring år 2000 opstod nye muligheder for at knytte protokoldata sammen med kortlægninger. Potentialet i de nye værktøjer ses klart i Jens Toftgaard Jensens arbejde med Aarhus, og bl.a. Ramsings arbejder om København er i dag digitaliserede og indbygget i GIS-systemer (Toftgaard Jensen og Norskov 2005; Perner 2021).

Da både de ældste kort og de mest præcise skriftlige kilder stammer fra 17-, 18- og 1900-årene er det selvsagt denne periode, som hidtil har fyldt mest i digitaliseringsprojekterne og deres tilknyttede forskningsspørgsmål. Hensigten med denne artikel er at vise, at arbejdsmetoden også rummer et stort potentiale for studiet af ældre faser af købstædernes historie af interesse også for de arkæologer, som har det arkæologiske ansvar for udgravninger i landets gamle købstæder.

Museumsloven af 2001 og dens konsekvenser for dansk arkæologi

Museumsloven af 2001 havde som sigte at bevare fortidsminder ved, som generelt princip, at pålægge ødelæggeren udgiften til en forudgående udgravning. Ved første øjekast kunne det se ud til, at forandringerne som følge af den nye lov ville være til at overse, da offentlige bygherrer allerede inden lovændringen afholdt udgifterne til arkæologiske undersøgelser, mens private bygherrer kun stod bag en mindre del af de anlægsarbejder, som udløste en arkæologisk undersøgelse. Alligevel fik den nye lov vidtrækkende konsekvenser for kvaliteten og antallet af de arkæologiske undersøgelser i et omfang, som næppe nogen havde forudset.

En afgørende forandring var, at den økonomiske model for udgravninger fra 2002 blev formaliseret i en sagsgang mellem museerne og det statslige kontrolorgan, Kulturarvsstyrelsen.[1] Loven gav et juridisk rygstød til sektoren og medførte en øget professionalisering og kvalitetssikringsproces – både i den statslige styrelse og på de arkæologiske museer. I løbet af en kort årrække udvikledes et sæt af ensartede metoder til fx arkæologiske forundersøgelser i det åbne land. Disse standarder vandt national udbredelse og førte til en stor stigning i antallet af arkæologiske undersøgelser.

Kort fortalt viste Danmark sig at rumme langt flere væsentlige fortidsminder, end nogen havde forestillet sig, og med Museumsloven af 2001 blev det for første gang muligt at holde nogenlunde trit med ødelæggelserne udløst af anlægsarbejder. De arkæologiske afdelinger på museerne voksede markant og udviklede sig til selvbærende faglige enheder med voksende forskningskompetencer udviklet i et parløb med statens stigende krav på området i form af flere gange skærpede kvalitetskrav til varetagelse af arkæologiske ansvarsområder.

Den ovenstående udvikling er nogenlunde ensartet i hele Danmark og beskriver arkæologien i

det åbne land, men hvilke forandringer medførte Museumsloven af 2001 for arkæologien i middelalderbyerne? Her er udviklingen en anden og præget af store regionale forskelle, som skævvrider det samlede billede af den arkæologiske virksomhed i Danmarks købstæder.

I det åbne land er erfaringerne fra de første to årtier med den nuværende museumslov, at bevaringshensynet i loven *de facto* ikke har spillet nogen rolle. Kun i meget få tilfælde vælger en bygherre at *in situ*-bevare fortidsminder gennem ændringer af projektet. Årsagen er, at udgiften til udgravning vurderes at være er et mindre onde, end hvad en ændring af projektet vil medføre.

Undersøgelser på gamle matrikler i middelalderbyernes komplicerede kulturlag er helt anderledes bekostelige. Typisk kan udgravning af få hundrede m^2 i en middelalderlig bykerne beløbe sig til millionbeløb, og dette udgiftstryk har forskellige konsekvenser forskellige steder i landet. For nybyggerier i byerne er den typiske konsekvens, at bygherre vælger pilotering eller skånsom fundering frem for udgravning. Afhængig af den valgte metode kan det bevare langt størstedelen af kulturlagene på stedet uden at være væsentligt fordyrende for byggeriet. Men i de middelalderbyer, som i dag er mindre byer, kan selv den ekstra piloteringsudgift have som konsekvens, at ledige grunde i den gamle bykerne forbliver ubebyggede i årtier. Uanset om der bygges på pilotering eller slet ikke bygges, er konklusionen, at museumslovens bevaringshensigt faktisk virker i middelalderbyerne.

I forskningsmæssig henseende har det den afledte konsekvens, at både metodeudvikling og datatilvækst foregår markant langsommere end i andre dele af den arkæologiske sektor. Generelt er det sådan, at det kun er i landets største byer, byggeprojekterne har et omfang og en økonomi, som medfører, at bygherre ønsker en egentlig arkæologisk udgravning foretaget. Det gælder først og fremmest København og derefter i aftagende omfang nutidens voksende byer, Aarhus, Odense og Aalborg.[2] Med andre ord afspejler tilkomsten af nye arkæologiske data den nuværende økonomiske aktivitet i landet, som var markant anderledes end forholdene i middelalderen.

Hvad angår udgravninger i middelalderbyernes offentlige rum, typisk gader og torve, er situationen en lidt anden end på byens grunde, da undersøgelsesaktiviteten er mere ensartet geografisk fordelt. I de store byer er destruktionsgraden af kulturlagene under gader og torve mere omfattende end i mindre byer, og over hele landet udføres der mange tracé-gravninger, typisk udbygning af kloaknettet udløst af miljøkrav og/eller klimasikring. Denne type undersøgelse medfører markante gener for byernes indbyggere i form af lukning af infrastruktur og foregår etapevis under et vist tidspres; et ikke-optimalt udgravnings-setup, som udgør det muliges kunst. På området er der sket store fremskridt i brugen af digital registrering, brug af metaldetektor og soldning, men da mange gader i byerne er uændrede siden middelalderen, fortæller udgravningerne primært om gadenettets udvikling og i langt mindre omfang om det liv, som udspillede sig på byens grunde.

Sammenfatningsvis har Museumsloven af 2001 i de seneste to årtier haft afgørende betydning for dansk arkæologis udvikling. I det åbne land er antallet af undersøgelser vokset kraftigt, om end der i datamaterialet er en vis geografisk skævvridning som følge af en uens økonomisk aktivitet. Alligevel er der i de forløbne 20 år i stort set alle landets kommuner udført flere og bedre udgravninger i det åbne land end i hele den foregående periode. I middelalderbyerne er situationen mere differentieret. Hovedparten af udgravningerne foregår i gaderummene med offentlige bygherrer. Ved flertallet af nybyggerier på grundene vælges pilotering, eller andre former for skånsom fundering, og kun i nutidens største byer foretages der jævnligt egentlige større udgravninger på byens gamle grunde. I tilvæksten af nye data giver det en kraftig geografisk slagside i retning af nogle få byer og en metodisk-topografisk slagside i retning af tracégravninger i byernes gader frem for de bebyggede grunde.

Remote sensing og andre non-destruktive metoder

En anden markant udvikling i de seneste årtier er fremkomsten af en række non-destruktive metoder til at fravriste landskabet viden om dets historie. Udbredelsen af GIS og integrationen af historiske kort, luftfotos og LIDAR-scanninger udgør i dag sit eget forskningsfelt og er blevet en uomgængelig del af den arkæologiske praksis på museerne. Også her er den generelle konklusion, at landskabet har vist sig at rumme et uventet stort antal fortidsminder, som kan spores i forskellige kortlægninger, hvis udsagn kan stykkes

sammen foran computerskærmen uden at sætte skovlen i jorden.

Geofysiske metoder, som på forskellig vis virker ved at sende et signal ned i jorden og ud fra det returnerede måleresultat skabe en repræsentation af underjordiske forhold, har i mange tilfælde leveret valide resultater, som har givet mulighed for at dokumentere og opnå viden om fortidsminder uden først at grave dem frem af jorden.

Middelalderbyerne er stort set uden undtagelse fortsat eksisterende og bebyggede miljøer. De udgør altså ikke et forsvundet element i landskabet, man kan spore som afgrødespor eller højdeforskelle. Til gengæld eksisterer der fra byerne en betydelig mængde historiske kort, som danner det geografiske grundlag for at genskabe tidligere tiders forhold i byerne, som det vil blive præsenteret nedenfor.

I forhold til brugen af geofysiske metoder har dette vist sig særligt udfordrende i byerne. I de ganske få tilfælde, hvor en by er forladt, med Hedeby som det bedste eksempel, har det været muligt at opnå ekstraordinære resultater (von Carnap-Bornheim *et al*. 2007). I andre byer er erfaringen imidlertid, at tykkelsen af kulturlagene og mængden af moderne installationer, særligt rør og kabler af metal, giver store problemer med at fortolke måleresultaterne.

Middelalderbyen som palimpsest

Som beskrevet ovenfor er situationen for middelalderbyernes udforskning i de seneste årtier, at den arkæologiske videnstilvækst er forholdsvis begrænset og uens geografisk fordelt. Der er heller ikke udsigt til, at geofysikken eller andre grene inden for det naturvidenskabelige felt, den såkaldte Third Science Revolution in Archaeology, indenfor en overskuelig fremtid vil kunne udvikle en *deus ex machina*, der vil gøre byforskerne i stand til kigge ned i jorden og bagud i tiden.

Byfænomenet introduceredes i Sydskandinavien omkring år 700 med Ribes opståen. Ribe indgik i et netværk af lignende handelspladser omkring den sydlige Nordsø, som deler en række fælles træk. De synes at være kontrolleret af datidens konger, havde delvise møntøkonomier og lå placeret i etniske og kulturelle grænseområder, hvor sejlende købmænd kunne mødes på halvvejen, handle sig til lokale produkter eller udveksle indbyrdes (Søvsø 2018; 2020). Disse tidlige byer, emporier som Ribe og Hedeby, var frem til omkring år 1000 enerådende på den urbane scene i Danmark. Efter trosskiftet opstod en ny type byer i form af regionale centre for den fremvoksende verdslige og gejstlige administration; kongemagten og kirken. Det er byer som Lund, Roskilde, Odense og Viborg, som lå centralt placeret i forhold til det opland, de betjente og kontrollerede (Andrén 1985; Kristensen og Poulsen 2016: 61ff). Handelen var fortsat koncentreret i emporierne. I løbet af ældre middelalder udfyldtes hullerne i netværket af byer med de såkaldte *strand- og akselkøbinge*, byer placeret i knudepunkter mellem trafik til lands og vands, som kom til at fungere som regionale centre for både handel og håndværk samt verdslig og gejstlig administration (Matthiessen 1922, 1927). Den samfundsmodel, som arbejdsdelingen mellem land og by var udtryk for, viste sig langtidsholdbar og fungerede helt frem til industrialiseringen i det sene 19. årh.

Senest fra 720'erne, hvor Ribes monopolmønt, Wodan/monster-sceattaen, slog igennem, synes byerne at have været kontrolleret af kongen. I emporiernes tid for at sikre adgang til varer og tjene penge på handel. Efter trosskiftet i stigende grad også som brohoveder for etableringen af den kristne kongemagt og fortsat under kongelig kontrol. Fra begyndelsen og frem til i dag består en by af gader og grunde, hvis inspiration i sidste ende trækker på antikke forbilleder i den romerske bycivilisation.

Dette uhyre kortfattede rids af byernes historie tjener til at vise, at Danmarks købstæder rummer mange fælles kontinuitetstræk. I flertallet af byerne er der fortsat bevaret huse fra senmiddelalder eller renæssance, mange gadeforløb er uforandrede siden middelalderen, og de fleste bykirker kan føre deres historie tilbage til ældre middelalder. I en del byer skete der store forandringer og saneringer i forbindelse med industrialiseringen fra slutningen af 19. årh., men ofte er nedrevne huse og andre tidligere forhold dokumenteret i kort, tegninger eller fotos.

Også de arkæologiske udgravninger i byerne støder ofte på særdeles langlivede strukturer. Skelgrænser ud mod gaderummet eller nabogrunde kan ofte følges langt ned i middelalderen og nogle gange helt tilbage til byens ældste tid (fig. 1).

Årsagen til eksistensen af disse langlivede, træge strukturer er først og fremmest, at byens struktur fungerede. Og den vedvarende bebyg-

Fig. 1. Danmarks første byarkæologiske udgravning blev foretaget i Ribe i 1955-56. Feltet var placeret på en brandtomt imellem Grønnegade og Præstegade, hvor Mogens Bencard og arbejdsmænd gravede sig ned igennem 4 m tykke kulturlag. Her ses feltet fra vest i Præstegade. Mindre end 1 m under overfladen fremkom et stenhus fra højmiddelalderen på sandfundamenter i et ellers træbygget miljø. Efterfølgende udgravninger i Grønnegade og Præstegade har vist, at begge gaders forløb går tilbage til slutningen af 1000-årene. Lige siden har bebyggelsen på grundene måttet respektere og orientere sig efter denne overordnede struktur. Syd for huset (til højre) ses et skel i form af et hegn. Det kunne følges tilbage til bebyggelsens opståen på stedet. Efter foto i sagen.
The first urban excavation in Denmark was conducted in Ribe from 1955-56. The c. 160 m2 trench was situated on a plot between Grønnegade and Præstegade that had been destroyed by a fire some 10 years earlier. By hand, Mogens Bencard and workmen dug their way down through four meters of organic layers. The photo is seen from Præstegade in the west towards Grønnegade in the east. Less than 1 meter below the surface, the remains of a 13th-century brick house appeared in an otherwise wood-built environment. The brick house stood on foundation trenches filled with sand. Later excavations in Grønnegade and Præstegade have shown that both streets go back to the second half of the 11th Century. Ever since, the settlement on the plots has been aligned in accordance with this overall grid. To the right, a plot boundary is seen in the form of a fence. This boundary could be traced back to the 11th Century as well.

gelse af byens grunde af de forskellige grundejere besværliggjorde større forandringer. Reformationen førte til nedlæggelse af mange kirker og klostre i byerne, nogle byer har lidt stor skade ved bybrande og atter andre har set tidligere bebyggede kvarterer forsvinde som følge af dårlige økonomiske konjunkturer eller andre former for kriser udløst af krige, sygdomsudbrud eller klimaforandringer. På trods af disse udsving overlevede byerne, og sporene efter tidligere tiders bebyggelsesmønstre er i forskellig grad overleveret i gadenettets forløb og udstrækning samt grundenes afgrænsning og den stående bebyggelse.

En dansk købstad kan således beskrives som en palimpsest, hvor sporene fra tidligere tider er overskrevet af senere bebyggelse, men alligevel i forskelligt omfang fortsat læsbart i byens plan og de arkæologiske levn under overfladen. De største forandringer i byerne skete i forbindelse med industrialiseringen, og derfor vil de ældste matrikelkort fra byerne være et godt udgangspunkt for at rekonstruere tidligere tiders forhold.[3]

Projekt Middelalderbyen og byarkæologien i dag

Projekt Middelalderbyen, som blev igangsat af Statens humanistiske Forskningsråd i 1977, er fortsat den største samlede danske indsats i retning af at opnå viden om byernes opståen og udvikling i middelalderen. En bærende tanke i projektet var, at man ved indsamling og registrering af det skriftlige kildemateriale vedrørende byernes historie sammenholdt med øvrige antikvariske oplysninger ville blive i stand til at besvare en lang række spørgsmål omkring byernes historie. Formålet var at reducere behovet for "… *opklarende udgravninger"*, fordi: "*under de rådende økonomiske forhold er det ikke muligt at gennemføre de storstilede udgravninger, der er byarkæologiens mest givende arbejdsform*" (Olsen 1985: 5).

For de ti byer, der blev udvalgt til projektet: Horsens, Køge, Næstved, Odense, Ribe, Roskilde, Svendborg, Viborg, Aalborg og Aarhus[4], betød det, at der for hver udarbejdedes en analog database baseret på randhulkort med kilderne til byernes middelalderlige historie. Og der blev udarbejdet et grundkort baseret på det ældste matrikelkort, hvorpå arkæologisk-topografiske oplysninger kunne stedfæstes. I dette stærke greb er indlejret en retrogressiv forståelse af byernes historie; at man fra senere bedre kendte tider kan slutte tilbage til tidligere, dårligere kendte forhold og afbilde dette på et kort. En lignende tankegang kan spores tilbage til de første byhistoriske arbejder af 17- og 1800-årenes antikvarer (Thorup 1839; Kinch 1869).

En svaghed ved Projekt Middelalderbyen var, at det kartografiske grundlag var et matrikelkort fra anden halvdel af 1800-tallet, som blev sammenholdt med det skriftlige kildemateriale fra middelalderen. Også dengang var det muligt at genskabe endnu ældre forhold ud fra andre kilder, som det vil blive vist nedenfor (Degn 1983). Måske blev dette arbejde vurderet til at være for omfattende?[5]

Syv af de 11 planlagte monografier udkom i tidsrummet 1985-1992, mens bindet om Aarhus så dagens lys i 2013 som del af et projekt støttet af Veluxfondene, der også omfattede digitalisering af den analoge databases poster samt udarbejdelse af en syntesepræget fremstilling af Danmarks byer i middelalderen (Nielsen 1985; Johansen 1986; Andersen 1987; Krongaard Kristensen 1987; Christensen 1988; Reinholdt 1992; Knudsen & Kock 1992; Jantzen 2013; Krongaard Kristensen og Poulsen 2016).

Digitaliseringen af dansk arkæologi herunder udbredelsen af GIS-software forløb omtrent synkront med implementeringen af Museumsloven af 2001. Fra Kulturarvsstyrelsens side understøttedes GIS-programmet MapInfo, der i en årrække fremover udgjorde en national standardløsning. Det var nu muligt at udarbejde digitale opmålinger af udgravninger, stedfæste disse geografisk og på skærmen sammenholde dem med andre kortlag – det arbejde, som tidligere foregik ved et lysbord. Fra universiteterne og på de arkæologiske museer blev denne proces primært drevet af forhistoriske arkæologer, som var aktive i det åbne land.

Sideløbende opstod netværket HisKIS, *Historisk-Kartografisk InformationsSystem*, som også så mulighederne i GIS, og hvis sigte var at arbejde med de historiske kort i et retrogressivt perspektiv, altså at rekonstruere tidligere forhold ud fra de spor, de har sat sig i senere kortlægninger (Møller 2004; Korsgaard 2006; Møller 2021). Her var de drivende kræfter historikere og geografer, og fokus lå i første omgang på de perioder, som de pågældende kort var skabt i, landboreformernes tid, og så naturligvis den enorme opgave med at få scannet og tilgængeliggjort den overvældende mængde af historiske kort i Kort- og Matrikelstyrelsens arkiver, som i dag kan tilgås på hjemmesiden Historiske Kort (Historiske Kort).

I denne digitaliseringsproces blev dansk byarkæologi stående på perronen. Byernes tykke kulturlag og ofte flere registreringsniveauer over hinanden udgjorde en reel udfordring i forhold til GIS-programmernes begrænsning til 2D. En anden forsinkende faktor var, at metodeudviklingen i byarkæologien forløb langsommere end i det åbne land, som i højere grad kunne ride på bølgen af udgravninger udløst af Museumsloven af 2001. Det har desværre haft som konsekvens, at GIS-systemernes muligheder fortsat kun i begrænset omfang er udfoldet inden for studiet af byer.

Som det fremgår ovenfor, er videnstilvæksten om middelalderbyerne begrænset og uens geografisk fordelt. For at rette op på dette kunne byarkæologer i højere grad fokusere indsatsen i retning af at udvikle nye metoder til at blive klogere på de enkelte byer. Nedenfor præsenteres en simpel GIS-baseret metode til trinvis genskabelse

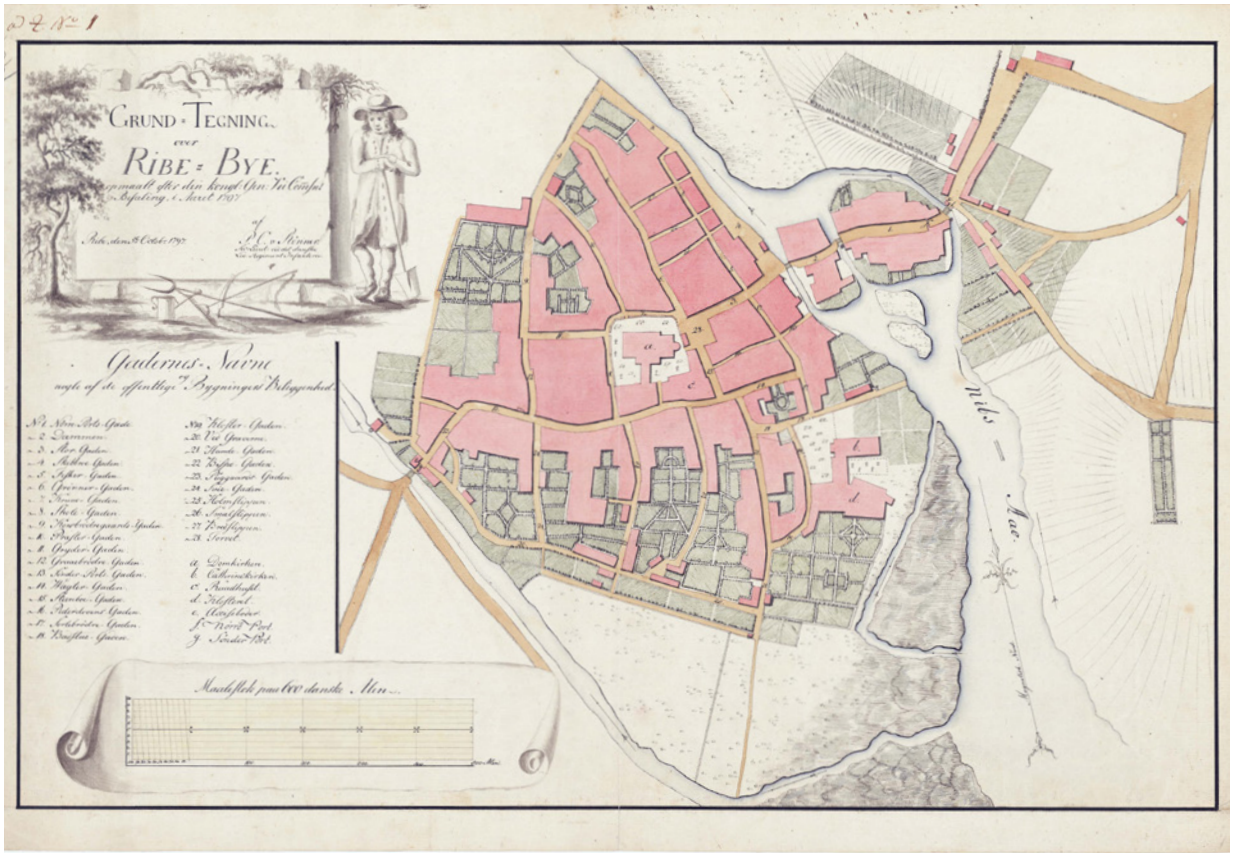

Fig. 2. Vejkommissionens kort over Ribe. Kartouchens ordlyd er: Grund-Tegning over RIBE-BYE. opmaalt efter den kongl:Gen:Vei Comsns Befaling i Aaret 1797. Ribe, den 5te Octobr 1797. af P.C. v: Rönner. Sec:Lieut: ved det danske Liv-Regiment Infanterie. Efter original i Det Kgl. Bibliotek.
The Royal Road Commission's 1797 map of Ribe. The legend says: "Grund-Tegning over RIBE-BYE. opmaalt efter den kongl:Gen:Vei Comsns Befaling i Aaret 1797. Ribe, den 5te Octobr 1797. af P.C. v: Rönner. Sec:Lieut: ved det danske Liv-Regiment Infanterie."

af præcise matrikelkort over en købstad i 1801, 1761 og 1682. Afslutningsvis bruges disse til at foretage en kortlægning af grundene i *Ribe Bys Jordebog* anvendt fra 1450'erne til omkring 1600, som afslører omridset af Ribes enorme højmiddelalderlige torv. De digitale løsninger til at udføre dette arbejde har været almindeligt tilgængelige i de sidste 20 år. Tilsvarende kortlægninger kan udføres for landets øvrige købstæder og vil formentlig kunne kaste en lang række væsentlige nye erkendelser af sig.

Historiske kort og matrikelkort fra danske købstæder

Nogle købstæder blev opmålt præcist og på matrikelniveau allerede i slutningen af 1700-årene i form af grundtakstkort eller konsumtionsgrænsekort (Korsgaard 2006: 94ff). For andre byers vedkommende, herunder Ribe, udgøres den ældste nogenlunde præcise opmåling af det kort, Den Kongelige General Vej-kommission lod udføre i slutningen af 1700-årene (Korsgaard 2006: 98f, 123). Vejkommissionens kort afbilder det overordnede bylandskab i form af de omgivende vandløb, vådområder og dyrkede arealer, mens landskabsrelieffet vises med bakkestreger. Af selve byen er gadenettet, de bebyggede arealer, kirker og kirkegårde samt haver afbildet. En signaturforklaring oplister med tal gadernes navne, mens kirker og offentlige bygninger er markeret med bogstaver. De enkelte matrikler er derimod ikke afbildet.
Ribe blev opmålt i 1797 af sekondløjtnant P.C. von Rønner, og – på trods af enkelte fejl – kan kortet georefereres med nogenlunde succes (fig. 2). Tilsvarende kort over kongerigets øvrige købstæder er tilgængelige på *Historiske Kort* samlet under kortværket *Vejkort*. Vejkommissionens kort er en uomgængelig og fortsat kun begrænset udnyttet kilde også til byernes ældre historie.

Fig. 3. Techts kort over Ribe fra 1858 med lokaliteter omtalt i teksten. A: Grønnegade. B: Præstegade. C: Nørreport og Ydermøllen. D: Gravsgade E: Skovgade. F: Saltgade. G: Nederdammen. H: Mellemdammen. J: Overdammen. K. Skibbroen. L: Fiskergade. M: Sortebrødregade. N: Stenbogade O. Badstuegade. P: Sønderportsgade. Q: Horstorv. Kort: Styrelsen for Dataforsyning og Infrastruktur med tilføjelser.
Tehct's 1858 map of Ribe with sites mentioned in the text.

Et andet uomgængeligt kortværk, som har stor værdi i retrogressive studier af danske byer, er opmålingerne af de danske købstæder, der dannede grundlaget for de trykte kort til 1. udgave af J.P. Traps *Statistisk-topographisk Beskrivelse af Kongeriget Danmark* (Trap 1856-61; Dahl 2005). Samtlige kongerigets købstæder blev opmålt efter datidens bedste landmålingsteknikker, og resultaterne udtegnet på smukke kort, hovedparten i skala 1:4000. Også byernes markjorder blev udtegnet i 1:20.000. Kortene med bygrundene og markjorderne er tilgængelige i digital form på *Historiske Kort* samlet under kortværket *Trap, tegnede kort*, og viser de enkelte byer, som de fremstod, før industrialiseringen tog fart, og før forstæder indtog markjorderne. Kortene rummer mange oplysninger af historisk betydning og kan georefereres med godt resultat (fig. 3). Som ved

Nummer	Eyernes Navne og de Wurderede huuse	Wurderigens Summa	Forandrings-annotationer
Nørre Gade			
1	Een Gruund muuret Port, med Waaning til Portneren ower Porten, samme er Byens Publique Casse tilhørende 2 Etager høy, Steen tæckt, i alt 5 fag, Wurderet for	200	
2	Hans Jessen eyer en Wandmølle med 2de Qwærne, som bestaae af følgende Bygning. Et Længdehuus enkelt Etage indrettet til Mølle Wærk og Waaning, 1 etage, 7 fag. Et Sidehuus til Gaden, 2 etager, 5 fag. Et Huus i Gaarden indrettet til Stald og Brøggerhus, 1 etage, 5 fag. Tilsammen 17 fag Alt Steen Tæckt, Wurderet for	1000	

Tab. 1: De to første indførsler i Ribes 1761 brandtaksation.
The first two entries in Ribe's 1761 fire insurance.

№ 1	Rd	Rd
1st Qvarteer Nederdammen Søndre-Side		
1 Ribe Byes Nørreport, betegnet No 1 eyes af Byens publique Casse, og bestaar af en grundmuuret Bygning sat Twers ower Gaden, hworigennem Passagen falder. Over Portrummet boer Portneren. I Bygningen er 1 liden Stue med 1 Kakkelown og 1 Kjøkken, tækket med Tegltag, der alt med Portlaagerne blev taxeret for	220	**220**
2 Mølleren Hans Jessen ejer No 2 en Vandmølle med 2 Qwarne og dermed følgende bygninger A) Forhuuset til Gaden 1 Eta- ge 7 fag med Qwist ower 2 fag, hwori er indlemmet 3 fag halwtag til Gaarden, alt ege Bindingswærk, Tawl- muur og Tegltag, indrettet for for saawidt de 7 fag angaaer til Stuer, Kamre og Kjøkken med 3 Kakkelowne De 7 fag a 50 er Mølleværket 3 fag Halwtag a 20	350 400 60 **810**	
B) 1 Siidehuus ligeledes til Gaden 2 Etager, ege Bindingswærk, Tawlmuur og Tegltag, indrettet til Wærelser og bestaar af 5 fag a 60	300	
C) Et huus i Gaarden ligeledes af Bindingswærk og Tegltag, bestaaende af 7 fag. 1 Etage a fag 20	140	**1250**

Tab. 2: De to første indførsler i Ribes 1801 brandtaksation.
The first two entries in Ribe's 1801 fire insurance.

Vejkommissionens kort er de enkelte grunde ikke udskilt, men præcisionen er høj og i mange tilfælde vil Traps kort være den ældste præcise kilde til den nøjagtige placering af forskellige overordnede elementer i byens struktur; gadenet, vandløb m.m.

Ved lov af 11. februar 1863 blev det fra Indenrigsministeriet besluttet, at der skulle udarbejdes en matrikel for de danske købstæder til afløsning for den tidligere grundtakst (Korsgaard 2006: 94ff). Det førte til udarbejdelse af matrikelkort i skala 1:800 af bygrundene, som for de fleste byers vedkommende udgør det ældste nøjagtige matrikelkort visende de enkelte grunde. Disse kort blev målt og tegnet frem til 1880 og er ligeledes tilgængelige i digital form på *Historiske kort* under kortværket *Original 1*. De viser ikke blot de enkelte grunde, men også omridset af de stående huse på de enkelte grunde. Den fortløbende række af tildelte matrikelnumre danner grundlaget også for nutidens matrikulering, og kortene kan georefereres med høj præcision, typisk ved brug af et moderne matrikelkort. Kortet over Ribe Kjøbstadgrunde blev målt i 1866 og udgør to kortblade.

Med udgangspunkt i det ældste matrikelkort og ved sammenligning med Traps kort og Vejkommissionens kort er det relativt ukompliceret, men arbejdskrævende, at genskabe et matrikelkort over en dansk købstad i tiden omkring år 1800. Genskabelsen af de ældre forhold kvalificeres selvsagt af grundigt kendskab til den pågældende bys historie og bygningsmasse i perioden.

I det tidligere hertugdømme Slesvig er situationen en lidt anden. For de sønderjyske middelalderlige købstæder i det nuværende Danmark, Haderslev, Aabenraa, Sønderborg og Tønder[6], findes matrikelkort, *Gemarkungskarten*, opmålt i 1870'erne og tilgængelige på *Historiske kort* under kortværket *Original 2*. De kan anvendes til at udarbejde et digitalt matrikelkort fra dette tidsrum, som ved sammenligning med ældre kort kan føres tilbage i tiden. Altså samme proces som ovenfor beskrevet for kongeriget og med lige godt resultat, men med andre kort.

Brandtaksationer som redskab til genskabelse af ældre matrikelkort og den stående bebyggelse

Københavns katastrofale brand i 1728 førte til oprettelsen af almindelig brandforsikring for københavnske ejendomme i 1731. Forsikringsordningen forudsatte både kendskab til ejerforhold, et vist kendskab til de enkelte ejendomme samt en værdiansættelse, og disse oplysninger blev nedfældet i brandtaksationer, som således rummer oplysninger om alle byens eksisterende grunde og deres bebyggelse på taksationstidspunktet. I 1736 udvidedes ordningen med de sjællandske amters byer og i 1740'erne kom de sønderjyske købstæder med.

I 1761 oprettedes den offentlige brandforsikring for købstæder. De enkelte byer blev minutiøst gennemgået af en gruppe af lokale, beskikkede taksationsmænd og resultatet renskrevet i en omfangsrig protokol, hvor pennen blev ført af byskriveren. For de fleste danske købstæder vil dette dokument udgøre den ældste samlede beskrivelse af byens bygningsmasse. Nogle af disse protokoller er tilgængelige på Rigsarkivets *Arkivalieronline*, og kan søges frem i databasen Daisy (Daisy). Andre er fortsat kun tilgængelige som affotograferinger på mikrofilm eller i fysisk form og kræver derfor et besøg på enten et af landsarkiverne eller Rigsarkivet.

For Ribes vedkommende viste det sig, at der i restaureringsarkitekten Hans Henrik Engqvists arkiv, hvis Ribe-del er i Den antikvariske Samlings arkiv (nu Museum Vest) befandt sig en fotokopi af byens brandtaksationer fra både 1761 og 1801 (ASR 1677). Det blev forfatteren til denne teksts første møde med gotisk håndskrift, og at kunne læse ældre håndskrift er en selvfølgelig forudsætning for at kunne arbejde med arkivalierne. Efterfølgende er Ribes brandtaksationer fra 1761 og 1801 blevet fuldstændigt transskriberede, så teksten nu findes i digital, søgbar form. Dette er gjort ved at følge den anvendte stavemåde og med samme ombrydning af teksten som i originalen. For at give et indtryk af 1761-taksationen gengives de to første numre i protokollen i tabel 1 (tab. 1).

Nr. 1 er byens middelalderlige Nørreport, som blev nedbrudt i 1843 (Madsen 1991). Teksten beskriver både bygningens materialer, antal etager og fag samt oplyser om anvendelse og ejerforhold samt naturligvis en vurdering i Rigsdaler. Det samme gør sig gældende for indførsel nr. 2, vandmøllen med navnet Ydermøllen.

Således fortsætter teksten, der ved afslutningen af den første gennemgang d. 16. marts 1761 omfattede 370 grunde. I 1762 kom byens to eksisterende kirker, Domkirken og S. Katrine kirke med. 1761-taksationen blev opdateret med foran-

dringsannotationer frem til 1770, hvor antallet af grunde var vokset til 376.

Fra Ribe eksisterer også brandtaksationer fra 1771, 1781, 1791, 1801, 1810, 1817, 1827, 1837, 1847 og 1857. De giver mulighed for at udrede byens bebyggelseshistorie igennem det 18. og 19. århundrede med meget stor præcision. Som nævnt ovenfor er det imidlertid kun taksationerne fra 1761 og 1801, som museet indtil videre har undersøgt. De første to poster i 1801-taksationen svarer til de første to fra 1761. Oplysningerne fremgår af tabel 2.

Til forskel fra tidligere rummer teksten nu flere oplysninger om bygningernes indretning og anvendelse (tab. 2). Protokollen ajourførtes frem til juli kvartals afslutning i 1810, og antallet af grunde var da steget til 384 inklusive en gård, *Teglgaarden*, beliggende på bymarken.

Ved at sammenholde det ældste matrikelkort med oplysningerne i brandtaksationerne er det muligt at rekonstruere et matrikelkort over byen på taksationstidspunktet. I en by som Ribe, hvor de senere forandringer er til at overse, er dette arbejde ikke forbundet med store udfordringer, og der kan opnås en nøjagtighed på tæt ved 100%. Jævnføringsarbejdet mellem 1761-brandtaksationen og 1866-matrikelkortet var i vidt omfang allerede udført af Hans Henrik Engqvist, som i margen af fotokopien af 1761-brandtaksationen havde tilføjet 1866-matrikelnumrene. Dette arbejde blev udført i forbindelse med udgivelsen Bevaringsplan Ribe (Engqvist 1969).

De stående huse nævnt i taksationen kan også genskabes med stor nøjagtighed, selv hvis der siden er sket forandringer med grundstrukturen eller bygningsmassen. Som eksempel vises her de omtalte to første poster i taksationerne indtegnet på 1866-matrikelkortet og suppleret af Jørgen Roeds tegning af Ribes Nørreport fra 1841 (fig. 4).

Bygningernes størrelse er i taksationerne angivet i fag og etager. Et fag udgør ikke et fast defineret mål, men ligger typisk i intervallet 1,2-1,6 m lidt afhængig af bygningens størrelse. Med disse oplysninger kan man grund for grund og karré for karré genskabe byens grunde og de stående huse. Her vil ældre fotos og andre antikvariske oplysninger ofte også være et væsentligt supplement for at få lagt puslespillet korrekt og få øvelsen til at gå op.

For Ribes vedkommende er alle byens grunde og de stående huse rekonstrueret ud fra oplysningerne i 1801- og 1761-taksationerne. Brandtaksationernes oplysninger er tilknyttet GIS-lagene som metadata. Det har givet et detaljeret indblik i datidens købstad, som kaster en hel række forskningsspørgsmål af sig og giver et solidt udgangspunkt for at forsøge at arbejde sig endnu længere tilbage i tiden (fig. 5).

		Første fierding
1	No 2	Claus Nielsøn Kirchebye eyer een wandmølle, Hans Pedersøn Møllen hafuer i Leye. Grunden: 66 Rigsdaler, 4 mark Bygningen: 42 rigsdaler, 4 mark

Tab. 3: "Ydermøllen" er første indførsel i 1682-grundtaksten.
"The Outer Mill" is the first entry into the 1682 plot tax.

1682-grundtaksten

For at tilvejebringe et ensartet beskatningsgrundlag for byerne indførte enevælden i 1682 den såkaldte grundtakst, som består af en vurdering af samtlige byens grunde og de på dem stående bygninger. De kan være mere eller mindre detaljerede for de enkelte byer, men rummer som minimum også oplysninger om ejendomsforholdene. Nogle af købstædernes 1682-grundtakst er tilgængelig i digital form på *Arkivalieronline*, og grundtaksten udgør en meget væsentlig kilde til købstædernes historie i denne periode, som er blevet flittigt benyttet af historikere.

En fotokopi af *Riberbyes Grundtaxt Anno 1682* befandt sig også i Hans Henrik Engqvists Ribearkiv og er i lighed med 1761- og 1801-brandtaksationerne blevet transskriberet af forfatteren og findes nu i digital form som et søgbart dokument.[7] Også her er stavemåde og tekstens ombrydning bibeholdt som i originalen. Da formålet er beskatning og ikke forsikring er den offentligt ejede Nørreport ikke omtalt. Ydermøllen udgør derfor den første indførsel og beskrives om det fremgår af tabel 3.

Desværre rummer Ribes 1682-grundtakst ikke andre oplysninger om grunde og bygninger end vurderingen. Alligevel kan man ud fra oplysningerne rekonstruere byens grunde med stor sikkerhed. Det skyldes, at listen er opdelt efter fjerding og gader, som muliggør en sikker rekonstruktion af ruten rundt i byen. Desuden rummer Ribe man-

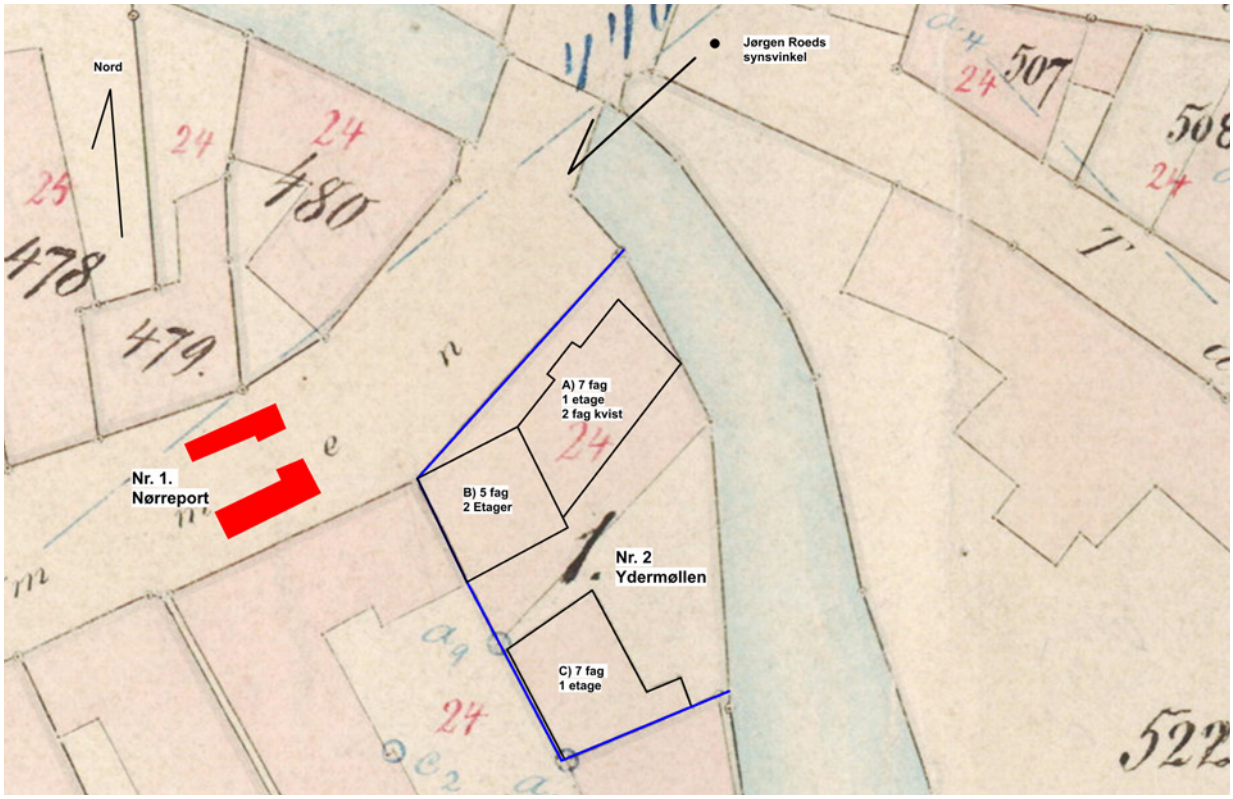

Fig. 4. Foroven: Posterne 1 og 2 i 1801-brandtaksationen tegnet ind på matrikelkortet fra 1866. Ruinen af Nørreport blev registreret i en arkæologisk undersøgelse i 1994 (Skov 1995). Forneden ses en radering af Jørgen Roed udført efter tegning dateret 1841. Nørreport blev revet ned i 1843, mens Ydermøllen i dens daværende form blev nedrevet i midten af 1800-årene. Af de omtalte bygninger er kun baghuset, nr. 2 C) bevaret i dag. Til gengæld er der overensstemmelse mellem tegningen og brandtaksationens oplysninger og 1801 bygningsmassen kan rekonstrueres præcist. Baggrundskort: Geodatastyrelsen.

Top: The information in the 1801 fire insurance drawn on top of the cadastral map of 1866. The remains of Nørreport were documented in an archaeological excavation in 1994. Below: Drawing of Nørreport by Jørgen Roed in 1841. Nørreport was demolished in 1843, and the Outer Mill seen on the drawing shortly thereafter. Of the buildings mentioned, only no. 2C) is still standing. Nevertheless, there is an accordance between the drawing and the information in the fire insurance, allowing a precise reconstruction of the demolished buildings.

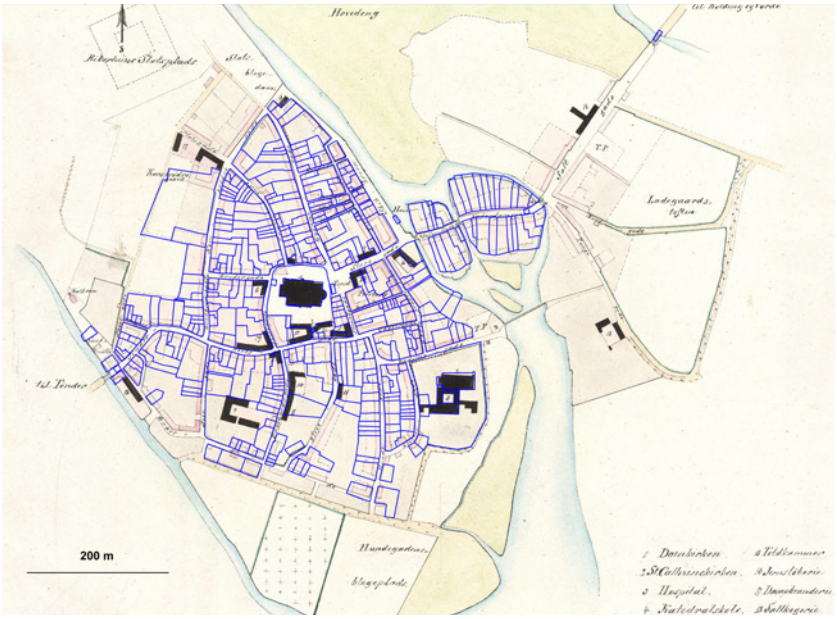

Fig. 5. Rekonstrueret matrikelkort over Ribe i 1761 baseret på brandtaksationens oplysninger. Foruden de viste grunde lå der et mindre antal stalde uden for Nørreport. Vist på Techts kort fra 1858 til 1. udgave af Traps Danmarksbeskrivelse. Baggrundskort: Styrelsen for Dataforsyning og Infrastruktur.
The plots in Ribe reconstructed on the basis of the information in the 1761 fire insurance. Furthermore, there were a few plots outside Nørreport to the northeast.

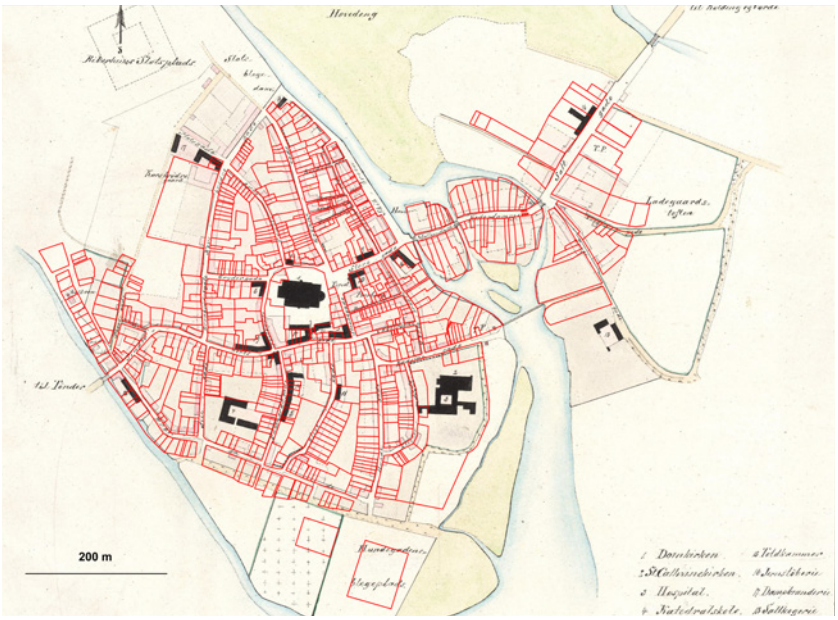

Fig. 6. Rekonstrueret matrikelkort over Ribe i 1682 baseret på grundtakstens oplysninger. På dette tidspunkt var der stadig en forholdsvis tæt bebyggelse omkring Sønderport. Baggrundskort: Styrelsen for Dataforsyning og Infrastruktur.
The plots in Ribe reconstructed on the basis on the information in the 1682 plot tax. Back then, there was still a quite dense settlement around Sønderport.

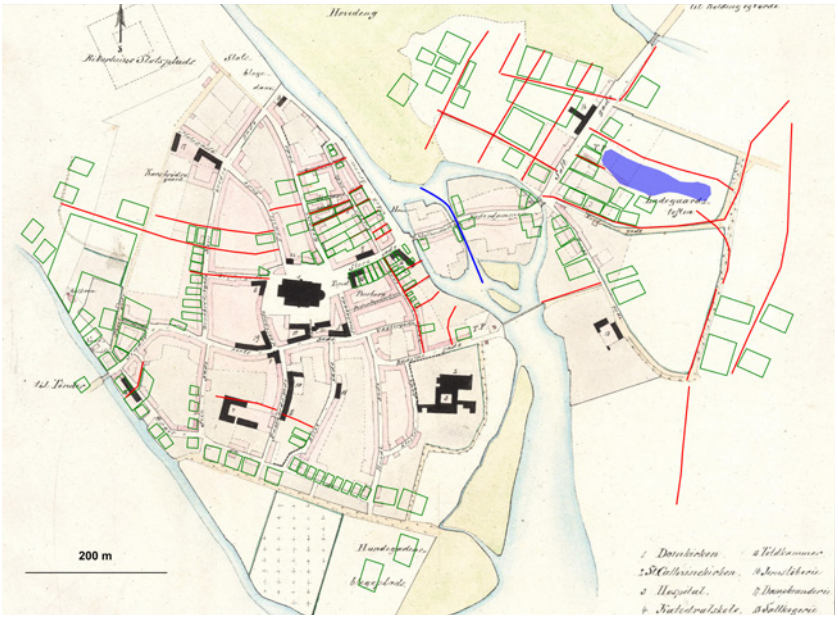

Fig. 7. Kortlægning af oplysningerne i Ribe Bys Jordebog. Grøn signatur markerer grunde, mens de omtalte gader og færdingstier er markeret med rød streg. Vådområdet Paypyt på nordsiden af åen er vist med blå farve. Baggrundskort: Styrelsen for Dataforsyning og Infrastruktur.
Tentative mapping of the information in Ribe's Land Register. Plots are shown in green, and streets and minor alleys are in red. The wet area "Paypyt" north of the river is shown in blue.

ge bevarede bygninger fra før 1682, der kan anvendes som ankerpunkter i rekonstruktionen. Og det er en stor hjælp, at den oprindeligt u-nummererede grundtakst er ajourført med 1801-brandtaksationens løbenumre og ejere.[8] 1682-vurderingerne af grundene giver også mulighed for at foretage relative sammenligninger mellem nabogrunde og således vurdere, om der er sket forandringer.

1682-grundtakstens sidste indførsel er fra kort efter 1707, og listen rummer i alt 596 grunde.[9] Det vil sige, at der frem til 1761-brandtaksationens 370 grunde skete et fald på mere end 200 grunde. Det er en nedgang på næsten 40% på lidt over et halvt århundrede svarende til, at der hvert år tilkom fire nye øde grunde. En udmærket dokumentation af det velkendte forhold, at ingen anden betydende dansk by har oplevet en så voldsom tilbagegang som Ribe (Matthiessen, Smith & Hermansen 1929: 9ff). De hårdest ramte dele af byen var kvartererne omkring Gravsgade og Skovgade i den sydlige og sydvestlige del af byen (fig. 6).[10]

Ribe Bys Jordebog og torvet

Til belysning af Ribes lange historie er bevaret mange skriftlige kilder og særligt for perioden fra slutningen af middelalderen og fremefter i tid er kildematerialet righoldigt og omfattende. Det har dannet baggrund for de tidlige arbejder om byens historie, før arkæologien begyndte at bidrage (Terpager 1736; Thorup 1833; Thorup 1835; Thorup 1839; Kinch 1869; Kinch 1884; Matthiessen, Smith & Hermansen 1929).

I anden halvdel af det 20. årh. er det særligt Ole Degns *Rig og fattig i Ribe* omhandlende byen i tidsrummet 1560-1660 og Ingrid Nielsens *Middelalderbyen Ribe*, der viser kildernes potentiale (Degn 1981; Nielsen 1985). Førstnævnte var også et pionerarbejde i kraft af sin brug af kort, hvor kildeoplysninger dannede baggrund for socialhistoriske analyser afbildet på kort (Degn 1983).

Fra 1545 og frem er fra Ribe bevaret fuldstændige skattelister. De er ikke analyseret i denne artikel, selv om de er tilgængelige på *Arkivalieronline*. Skattelisterne er fjerdingsopdelte og oplister i topografisk rækkefølge byens skattepligtige borgere og deres skatteangivelse, men at stedfæste oplysningerne er kompliceret. En af årsagerne er, at skattelisterne ikke skelner mellem ejere og lejere, og da mange grunde havde indtil flere lejemål opstår mange usikkerheder undervejs på ruten rundt i byen (Degn 1985: 32ff).

En anden værdifuld kilde er Ribe Bys Jordebog, som også er let tilgængelig, da den er udgivet i en kommenteret udgave af Ingrid Nielsen (Nielsen 1979). Jordebogen blev påbegyndt i midten af 1450'erne og ajourført frem til omkring år 1600. Den består af en fortegnelse over de grunde, Ribe byråd administrerede og havde indtægter fra, i tekstens indledning formuleret således:

The*t*te er then jordh, som Riberby tagher aarligh re*n*te aff

Herefter følger 212 indførsler efterfulgt af tilføjede afsnit fra 1500-årene med oplysninger om byens rettigheder til marker og enge beliggende på bymarken. Jordebogen indeholder et væld af topografiske og personalhistoriske oplysninger. Flertallet af stednavnene både i byen og på bymarken kan stedfæstes ud fra andre kilder og er blevet flittigt anvendt af byens tidligere historikere. Mange af personnavnene i indførslerne fra efter 1545 kan krydsrefereres med skattelisterne.

Et andet interessant element ved jordebogen er, at forskellige regneenheder anvendes til afgifterne. Både skilling grot, skilling engelsk, skilling lybsk og skilling dansk optræder i teksten på måder, som antyder, at forskellene i regneenheder kan skyldes kronologiske forhold, altså at de forskellige grunde på forskellige tidspunkter er blevet afgiftspligtige til byen.

Ingrid Nielsen kortlagde nogle af jordebogens oplysninger ud fra den da eksisterende viden (Nielsen 1985: 89f). Siden er der foretaget mange arkæologiske udgravninger, som har stedfæstet endnu flere af de i jordebogen omtalte elementer, både gadeforløb, slipper og bebyggelse. Desuden er det historiske kortmateriale nu aktiveret i GIS-systemer til at genskabe ældre matrikelkort, og fra en hel række af de fortsat stående huse i byen foreligger der bygningsarkæologiske undersøgelser, som fører de pågældende huses historie tilbage til jordebogens tid. Med denne viden er det nu muligt at omsætte jordebogens oplysninger i en egentlig kortlægning, som baserer sig på museets samlede viden indhentet ved arkæologiske udgravninger og kombineret med den arkivalske viden opnået ved studier af skriftlige kilder, fx målangivelser på forskellige grundstykker fra 1500-årene (fig. 7). For nogle grundes vedkom-

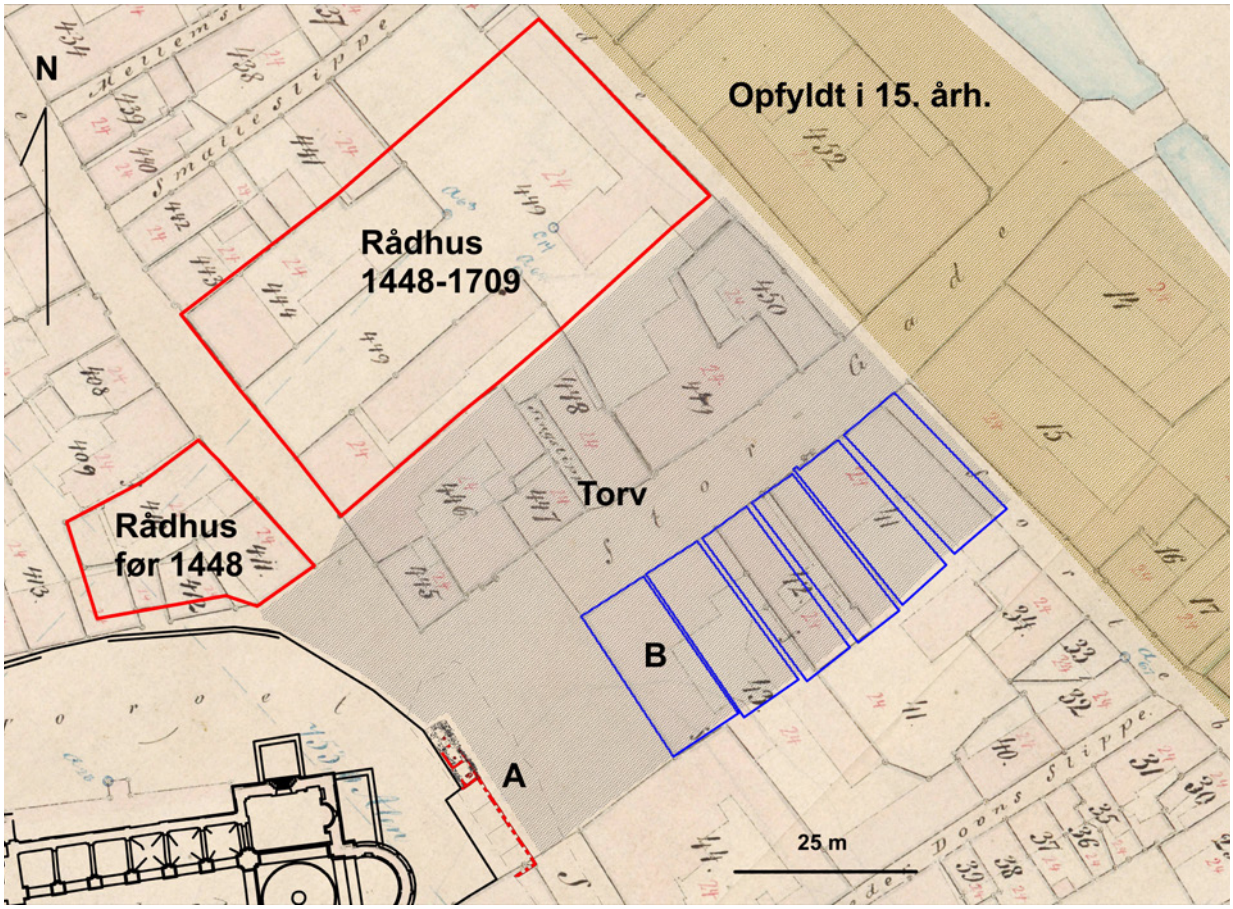

Fig. 8. Rekonstruktion af Ribes torv i høj- og senmiddelalder. A: de syv boder, kapitlet solgte til byen i 1544, udgravet 2013. B: De seks grunde, som byen ejede på jordebogens tid. Byens første rådhus lå på det sydvestre hjørne af Grønnegade. I 1448 købte byen et stenhus i tre etager med hvælvede kældre, som indrettedes til rådhus. Det lå på østsiden af Grønnegade. Oprindelig kan huset have været opført som børs af et kompagni købmænd fra Groningen, som gaden er opkaldt efter. Vist på matrikelkortet fra 1866. Baggrundskort: Geodatastyrelsen.
Reconstruction of Ribe's market square in the Late Middle Ages. A: Seven rental houses sold by the Cathedral chapter to the town in 1544, excavated in 2013. B: Six plots owned by the town in the Late Middle Ages. Ribe's first town hall stood on the southwest corner of Grønnegade. In 1448, the town hall was moved to a large three-storey brick building with a vaulted cellar on the other side of Grønnegade. This house was probably built in the 13th C. by a guild of merchants from Groningen.

mende kan de rekonstrueres præcist, mens der for andre er flere usikkerheder.

Jordebogen giver langtfra et komplet billede, da kun de til byen afgiftspligtige grunde omtales. Alligevel rejser fordelingen af disse grunde i byrummet en lang række spørgsmål, hvoraf nogle også har optaget den tidligere forskning. Enkelte af disse problemstillinger skal omtales i denne forbindelse.

Størstedelen af byens forstad nord for Nørreport omkring Saltgade, som i middelalderen omfattede tre af byens seks kirkesogne, tilhørte på jordebogens tid byen, og både et net af gader og mindre færdingstier samt en lang række grunde kan placeres til trods for, at området stort set kun rummede stalde og kålgårde. Her lå Ribe i vikingetiden, men ingen spor fra byens ældste tid synes at have indlejret sig i senere tiders bebyggelsesstruktur. Fra et betydeligt antal arkæologiske undersøgelser er der kendskab til ret udbredt bebyggelse også fra tidlig middelalder og højmiddelalder. En forklaringsmodel kunne være, at denne del af byen lagdes øde af pesten i 1350 og således tilfaldt byen. I takt med studehandelens fremvækst i 1400-årene fandt området ny anvendelse til stalde.

I den sydlige ende af byen, omkring Gravsgade, ejede byen også mange grunde. Her er forklaringen, at disse grunde blev udstykket i 1550'erne på det tidligere voldterræn nord for den voldgrav,

som i skriftlige kilder fra middelalderen kaldtes *fossura nova*, byens nye grav, og første gang er omtalt i 1394 (Nielsen 1985: 84).

På dammen, den kunstige vejdæmning, som siden 1200-årene førte trafikken over Ribe Å, er situationen den modsatte. Her ejer byen kun grundene omkring åens tre gennemløb, som udgjorde vital infrastruktur med både militær og økonomisk betydning. Det giver god mening. Af jordebogens oplysninger fremgår, at slusen, det løb, hvor den største vandmængde passerede, i 1400-årene var placeret imellem Mellemdammen og Nederdammen, hvor også det middelalderlige sogneskel mellem domsognet Vor Frue syd for åen og sognet S. Peder nord for åen er placeret (Nielsen 1979: løbenr. 2,3; Nielsen 1985: 60). Det tyder på, at Ribe Å oprindelig løb her.

Bevæger vi os mod vest ind mod domkirken, ændrer billedet sig igen. I de ånære områder, Skibbroen, Fiskergade og Sortebrødregade svarede mange grunde afgifter til byen. For kvarteret omkring Fiskergade finder det sin forklaring i, at dette gadeforløb og Skibbroen blev skabt ved opfyldning af byens grund i 1400-årene (Kinch 1869: 554). Omkring 1570 opstod den nordlige del af gadeforløbet omkring Bredeslippe, det såkaldte Nyjord (Nielsen 1979: løbenr. 246, 252). Omkring Overdammen/Storegade ejede byen hovedparten af grundene syd for gaden, og en stor del af dem svarede høje afgifter i skilling engelsk. Denne regneenhed anvendtes mest i 1300-årene og antyder, at udlejningen af grundene indledtes i dette århundrede. Til gengæld ejede byen ingen grunde på nordsiden af gaden (fig. 8).

Torveforholdene i Ribe i middelalderen er uklare (Nielsen 1985: 95f). Den torveplads øst for domkirken, som fremtræder på de ældste kort, opstod efter bybranden i 1580 var kun på ca. 1100 m^2. Ganske beskedent for en handelsby af Ribes vigtighed, men med til billedet hører også, at en stor del af datidens handel fandt sted fra butikker i de enkelte købmandsgårde omkring byens hovedstrøg; Sønderportsgade, Mellemdammen, Nederdammen og Saltgade. Mod sædvane var Ribes store rådhus i Grønnegade, som var i funktion fra 1448-1709, heller ikke placeret ud til torvet (Søvsø 2015). De middelalderlige kilder omtaler et Horstorv i nærheden af Sønderport, som nogenlunde kan placeres i bybilledet og udstykkedes i 1400-årene, mens hovedtorvet i byens hjerte blot kaldtes forum eller Fisketorvet. Det har ikke kunnet placeres nærmere i byrummet end i området øst for domkirken.

En forklaring på disse forhold kan være, at hele husrækken på nordsiden af Overdammen først kom til efter bybranden i 1580.[11] Det ville være den selvfølgelige årsag til, at byen ikke udlejede grunde på stedet i jordebogens tid og samtidig placere begge byens middelalderlige rådhuse ud mod torvet. De af byen ejede grunde syd for Overdammen kan udgøre en tidligere udstykket del af torvet i Ribe, som allerede foreslået af Ingrid Nielsen (Nielsen 1979: 39): Ud fra afgiften i skilling engelsk kan udstykningen af disse grunde være sket i 1300-årene (fig. 8).

Udgravningerne på Domkirkepladsen i 2012-13 afdækkede flere forhold til forståelse af byens torv (Alrø Jensen 2013; ASR 2391). Langs Stenbogades vestlige husrække fremkom en 15 m lang, to sten tyk munkestensmur udstyret med nicher på indersiden, som inddelte murværket i fire enheder. Nord herfor lå en række på tre små, grundmurede boder, i alt knap 10 m lang og kun lidt over 2,5 m bred. Hver bod var udstyret med et lille ildsted sat af tegl og i gulvlagene fandtes 42 mønter fra 1400-årene; kobbersterlinge, sterlinge, hulpenninge, viertelwitten og witten.[12]

Der kan ikke være tvivl om, at denne række af 4+3 boder må udgøre de syv boder kapitlet solgte til byen i 1544. De fire sydlige boder var dem, der gav navn til Stenbo(de)gade (Kinch 1869: 519). Boderne omtales 1330 som nyopførte og beliggende lige overfor tinget, som således også stedfæstes.

De samlede arkæologiske iagttagelser modsiger ikke denne udlægning af torveforholdene. I det foreslåede torveareal er der ikke fundet husrester i området ældre end senmiddelalderen. Den overordnede stratigrafi består af horisontale lag, som frem til højmiddelalderen er organiske og rummer mange rester af liggende og stående tømmer. Det er formentlig spor efter, at området har haft plankedække. I anden halvdel af 1200-årene brolagdes området med piksten. Udgravningerne på Ribe Domkirkeplads i 2012-13 berørte i begrænset omfang også dette område. Ud over boderækken fandtes 26 vægtlodder af bly fra høj- og senmiddelalder, hvilket bestyrker opfattelsen af området som torv allerede i højmiddelalderen.[13] Det rekonstruerede torv har et areal på over 4000 m^2 og må antages at være anlagt samtidig med anlæggelsen af dæmningen. Dette kan være sket

som led i en samlet nybefæstning og omkalfatring af Ribe i forbindelse med Riberhus' opførelse i 1268.

Før dæmningens anlæggelse passerede trafikken Ribe Å ved Badstuegade (Nielsen 1985: 95f). Der er spinkle spor efter, at hele arealet imellem Badstuegade, Domkirken og åen kan have udgjort et kæmpestort tidligmiddelalderligt torv. Forhåbentlig kan kommende undersøgelser hjælpe til at besvare dette spørgsmål.

Konklusion

Artiklen har præsenteret en simpel GIS-baseret metode til at genskabe tidligere tiders matrikelforhold i en dansk købstad ved at kombinere det ældste matrikelkort med forskellige skriftlige protokoldata. Det skal ikke skjules, at udførelsen af dette arbejde i Ribe har været både omfattende og tidskrævende til trods for, at der har været god hjælp at hente både i tidligere historikeres arbejde og eksistensen af forskellige jævnføringsregistre. Arbejdet har også været en øjenåbner, som har ført til en række nye erkendelser, hvoraf kun enkelte områder er præsenteret i teksten. Det til trods for, at Ribe må betragtes som værende en allerede grundigt undersøgt by med en lang forskningshistorie (Søvsø 2019). Derfor kan man forudse, at tilsvarende arbejder i andre af Danmarks købstæder også vil føre til en række af nye erkendelser og heraf afledte forskningsspørgsmål. Opfordringen er hermed givet videre.

Summary

Mapping the historical topography of Danish market towns – GIS integration of historical maps, fire insurance valuations, 1682-land tax and older tax lists and land registers.

After a brief introduction to the history of historical-topographical research, the article describes the impact of the 2001 Museum Act on Danish archaeology, both in rural areas and medieval urban centres. The preservation intent of the law is only effective in the costly cultural layers of the cities. In recent decades, this has led to less excavations in towns compared to open land and a significant geographical skew in urban archaeological investigation activities and, consequently, in the growth of knowledge and methodological development within the field of urban archaelogy.

Subsequently, as a supplementary alternative to excavation, a range of tools is presented to gain new insights into the cities through a retrogressive, GIS-based method. This method, using historical maps and written sources, enables precise reconstructions of past plots, the houses that stood on them, the names of the inhabitants, their occupations, etc. The city of Ribe is used as a case study. Since similar sources exist for most Danish market towns, the same method can also be applied in other cities.

Finally, the article exemplifies what the execution of this work has meant for the exploration of Ribe, including the possibility of mapping the information in Ribe city's Land Register and, based on this, reconstructing the extent of Ribe's market square in the High and Late Middle Ages.

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Noter

1 Oprettet 2002. 2012-15 med navnet Kulturstyrelsen. Fra 2016 Slots- og Kulturstyrelsen.
2 En undtagelse fra det generelle mønster er Ribe, hvor der løbende er foretaget en række store udgravninger, både som nødudgravninger og forskningsprojekter. Det skyldes Ribes helt særlige historie og omfanget og alderen af kulturlagene under byen (Søvsø 2019; Søvsø 2020: 25ff). En tilsvarende situation ses i Sigtuna i Sverige, som er en i dag lille by med en lang og rig historie, som afspejles i kulturlagene under byen.
3 Købstæderne i Danmark blev matrikuleret fra 1863-1885. Oftest blev matrikelkortet tegnet i skala 1:800 og er i dag tilgængelig i digital form på hjemmesiden Historiske Kort drevet af Styrelsen for Dataforsyning og Infrastruktur.
4 Til de ti byer bør tilføjes den nedlagte købstad Søborg i Nordsjælland, som Nationalmuseet påtog sig at undersøge inden for projektets rammer.
5 Restaureringsarkitekten Hans Henrik Engqvist benyttede allerede i 1960'erne Ribes brandtaksationer til at genskabe tidligere tiders matrikelforhold i dele af byen (Engqvist 1969).
6 De sønderjyske flækker regnes i denne sammenhæng ikke for købstæder.
7 Museumssagen ASR 1679 i Museum Vests arkiv.
8 Ud fra ejernavnene i ajourførslen må den være indført få år efter 1801.
9 14 grunde omtales som øde.
10 At det var netop disse områder, der lagdes øde imellem 1682-grundtaksten og 1761-brandtaksationen, kan udledes af antallet af grunde omtalt i de forskellige gader. Grundenes vurdering i 1682 kan give et indtryk af grundstørrelsen.
11 Ud fra skattelisterne fra før bybranden i 1580 placerede Ole Degn grunde her (Degn 1983: 46ff, kortblad 26). Der hersker en vis usikkerhed om den nærmere placering af personerne i listen, da de pågældende grunde befinder sig omtrent midt i sidste fjerding.
12 Tilgængelig på Museum VESTs online funddatabase http://sol.sydvestjyskemuseer.dk/advanced.php? ved søgning på Journalnummer ASR 2391 og Søgeord mønt.
13 Tilgængelig på Museum Vests online funddatabase http://sol.sydvestjyskemuseer.dk/advanced.php? ved søgning på Journalnummer ASR 2391 og Søgeord vægtlod.

Stavanger, Skagen 3 – den største utgravningen i en lite kjent Norsk middelalderby

Av Volker Demuth

Innledning

Etter Oslo og Bergen er Stavanger i dag Norges største by og sentrum for landets oljeindustri. Byen ligger sørvest i Norge, på nordspissen av halvøyen Jæren som har meget gode jordbruksforhold etter norsk målestokk. I middelalderen var byen et betydningsfullt bispesete, der den første kjente biskopen, Reinald, blir nevnt i kongesagaen *Morkinnskinna* etter en episode med kong Sigurd Jorsalfar på 1120-tallet (Ersland 2013: 33-34). Stavanger bispedømme omfattet i middelalderen store deler av det sørlige Norge. Enkelte forskere mener opprettelsen av bispedømmet og det såkalte *Stavangerprivileget* fra første halvdel av 1200-tallet ga starten til byen Stavanger (Helle 2008) selv om andre mener dette først skjedde med utstedelsen av byprivilegiet i 1425 (Hauge 2005: 41). Diskusjonen om byens oppkomst har vært intenst og har preget forskningen de siste årene (Brendalsmo & Paasche 2017). Også byens navn er blitt gjenstand for mye diskusjon, men bruken av moderne landskapsarkeologiske metoder har gitt en overbevisende ny tolkning. Deretter beror navnet på en stor steinblokk, som fungerte som eiendomsmarkør siden jernalderen (Iversen 2020).

De arkeologiske bidragene til byforskning i Stavanger har vært forholdsvis beskjedne, de få arkeologiske undersøkelsene som er gjennomført er av svært begrenset omfang (Helle 2006: 70). Ikke siden 1960-tallet er det gjennomført en større utgravning i byen. Denne foregikk på tomten *Skagen 3* som ligger mellom domkirken og havnen (Lillehammer 1972). Utgravingen i 1968 bidro med et viktig arkeologisk kildemateriale, som siden har ligget stort sett urørt i magasinene uten å bli tatt i bruk av nyere forskning. I de siste årene har jeg hatt anledning til å gjennomgå funnmaterialet og dokumentasjonen fra denne utgravingen, og resultatene har vist seg å være meget interessante og fortjener å bli trukket frem i lyset. I denne artikkelen vil jeg presentere dette materialet, om enn ikke legge frem en uttømmende nytolkning.

Fokusering på funnmaterialet følger en tendens i moderne historisk arkeologi om at "… *material remains now set the agenda and themes on their own termes,…*" (Hansen, Ashby & Baug 2015: 2). Funngjenstandene og konteksten den stammer fra anses altså som kilder som taler for seg selv. Objektene er viklet inn i mangfoldige flettverk av mennesker, sosiale konstruksjoner og forestillinger av identitet, og kan dermed gi innsyn i aspekter av den historiske realiteten som er ellers lite håndgripelig i arkeologisk forskning (Hofmann 2015: 112). Spesielt presentasjonen av gjenstandsfunnene fra Skagen 3 og tilgjengeliggjøring av disse for moderne forskning, anses derfor som et nødvendig steg i forskningsprosessen og som et viktig mål for seg selv.

Utgravningen Skagen 3 – oversikt

Stavanger har i dag en av de største konsentrasjonene av trehus i et norsk bysentrum. I de siste tiårene har det vært få store utbygginger i bykjernen, og derfor har det heller ikke vært noen større arkeologiske utgravninger. Den største undersøkelsen som noensinne er blitt gjennomført i byen hendte sommeren 1968. Et stort nybygg skulle oppføres på tomten *Skagen 3*, som ligger omtrent 60 meter fra inngangen til domkirken, og omtrent 90 meter fra dagens sjølinje i den beskyttede vågen, den gamle naturhavnen i Stavanger sentrum (fig. 1). Siden sjøen gikk noe høyere i middelalderen, lå tomten Skagen 3 både nær havna og domkirken. Plassen må dermed ha vært en av de mest prominente tomtene i middelalderbyen.

Etter at den eksisterende bebyggelsen ble revet i 1967 ble det besluttet å foreta en arkeologisk utgravning før nybygging. Den arkeologiske undersøkelsen ble ledet av en fremgangsrik arkeologistudent, som fikk opplæring og veiledning fra Asbjørn A. Herteig, lederen av de store utgravningene på Bryggen i Bergen (Lillehammer 1968: 4-6). I løpet av tre og en halv måned om sommeren 1968 ble i alt omtrent 150 m2 av tomten gravd ut, etter at de øverste lagene ble "… *brutalt fjerna med ein hjulskovel ned til like over det antatte mellomalderlaget*." (Lillehammer 1968: 7). Det fjernede laget bestod primært av brun hagejord, som inneholdt en del moderne funnmateriale fra 1600- til 1800-tallet. Omtrent 75 cm av det antatt moderne topplaget ble fjernet maskinelt, mens de underliggende lagene ble gravd ut manuelt. De intakte middelalderlagene var rund 2 meter tykke. Under dette var det steril sand, som ble påtruffet nesten 3 meter under den moderne overflaten. I alt ble omtrent 300 kubikkmeter kulturlag fra middelalderen undersøkt i de 16 uker utgravingen foregikk. Det ble tatt vare på store mengder funn, men det er noe uklart hvor mange funn som faktisk ble gjort på utgravingen. Den opprinnelige funnlisten inneholder 1155 nummer, i *Arkeologisk*

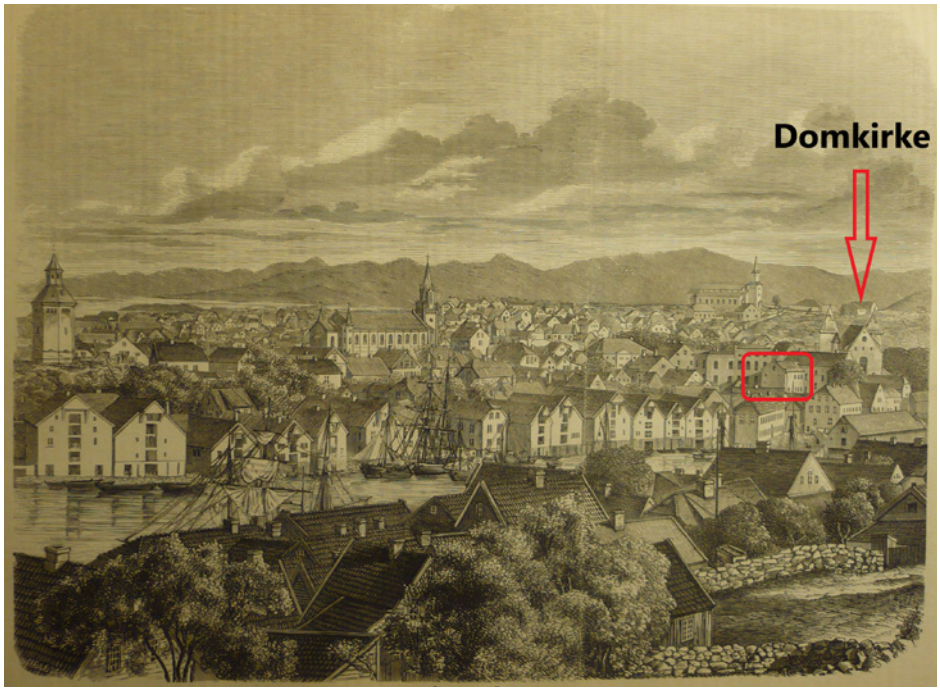

Fig. 1 Ansikt av Stavanger fra 1867. Domkirken er markert med rød pil, utgravningsområdet Skagen 3 er markert med rødt rektangel. *View of Stavanger from 1867. The cathedral is marked by a red arrow, the location of the excavation Skagen 3 is marked by a red square.*

museums database finnes 4740 enkelte funngjenstander, mens utgravningslederen nevner over 4000 keramikkfunn og 11000 beinfragmenter (Lillehammer 1972: 63, 72).

Undersøkelsen ble organisert etter mal fra Bryggenutgravingene, som hadde foregått siden 1955, en utgravning som hadde gitt nye metodiske impulser til skandinavisk og europeisk byarkeologi (Herteig 1969; 1985). Bærende element i dokumentasjonen var et rutesystem med ruter på 8x8 meter, som var knyttet til det kommunale oppmålingssystemet. Innenfor rutene ble det gravd stratigrafisk, og funnene ble knyttet til ruter og lag. Det øverste laget ble kalt *lag 1* det nederste som i enkelte ruter bestod av fin strandsand ble kalt *lag 22*. Ingen spesifikke lag eller stratigrafiske forhold ble definert eller dokumentert som *single contexts*, de noe som er blitt vanlig i i dag. Uansett må utgravingen og dokumentasjonen anses som en stor og hederlig bragd av utgravningslederen og -teamet, sett i lyset at bare tre av de 17 involverte personer på utgravingen hadde tidligere utgravingserfaring, og utgravingslederen hadde ennå ikke fullført arkeologistudiet (Lillehammer 1968: 4).

Skagen 3 – utgravningens stratigrafi, strukturer og bygningsrester

Bevaringsforholdene for middelalderlagene på Skagen 3 var forholdsvis gode ettersom 1800-tallets bebyggelse på tomten ikke hadde gravd seg ut kjellere. Som nevnt over bestod det øverste laget (lag 1) av brun, humusholdig jord. Sannsynligvis hadde det ligget en hage på stedet og i denne 'hagejorden' ble det observert en grunnmur antatt å være fra tidlig 1800-tall. Selv om det meste av lag 1 ble fjernet maskinelt ble likevel en rekke funn tatt vare på. Under dette tidligmoderne *lag 1* ble den første arkeologiske strukturen dokumentert i plan.

Et brannlag lå over nesten hele utgravingsfeltet, men var mest tydelig i den vestlige delen av undersøkelsesområdet. Her var dette et forkullet tregulv, bygget av 20-25 cm bredde og inntil 5 cm tykke treplanker (Lillehammer 1972: 60). Gulvet hørte til et hus som bare delvis lå innenfor utgravningsområdet. Gulvet fortsatte mot vest utenfor utgravningsområdet og ligger slik fremdeles bevart under nåværende gateløp (Skagen). I nord var bygningen forstyrret av en etterreformatorisk nedgravning (Lillehammer 1972: 60). Mot øst trakk tregulvet inn mot en steinmur, som gikk parallelt med gateløpet og som tolkes som ytterveggen av det nedbrente huset. Også i sør ble det funnet en steinrekke tolket som fundament for husveggen, men her lå imidlertid det brente tregulvet over muren (Lillehammer 1968: 7).

På det brente tregulvet inne i bygningen ble det funnet store mengder forkullet korn, spesielt i den sørøstlige delen av huset, noe som tyder på at det kan ha vært lagret sekker med korn der. I

utgravningsrapporten er det skrevet at det "… vart spadd opp 87 kg." (Lillehammer 1968: 7) men den totale mengden antas ha vært betydelig større. Det er nærliggende derfor å tolke huset som lagerbygning for blant annet jordbruksprodukter. Det er ikke publisert noen botaniske analyser av dette materialet, men pensjonert botaniker ved Arkeologisk museum, Eli-Christine Soltvedt, som i sin tid fikk sett materialet, kunne opplyse at kornet for det meste var bygg, men det var også havre. Begge deler var sannsynligvis lokalodlet på Jæren. Blandet med kornet fantes også forkullede erter, deriblant en del som på grunn av størrelsen minner om en lokal sort kalt *jærerter* (Bakkevig & Time 2007: 15). Denne belgfrukten ble gjerne dyrket til sammen med korn og er spesielt tilpasset det til tider harske klimaet på Jæren (Bakkevig 2020: 17). Disse forkullede makrofossiler representerer sannsynligvis en av de største kjente funn av norske åkerprodukter fra middelalderen. En radiologisk C14-datering av dette kornet ga en datering til 1230 – 1350 etter vår tidsregning (Lillehammer 1972: 63). Denne ganske grove dateringen passer også med funnmaterialet fra brannlaget (som presenteres lenger nede) og det er nærliggende å knytte dette brente gulvet til bybrannen fra 1272 som er nevnt i islandske annaler og er den eneste kjente og daterte middelalderbrannen i Stavanger (Lillehammer 1972: 63).

Det ble også funnet brente bygningstømmer, tolket som rester av det nedbrente huset øst for tregulvet og steinmuren og derfor utenfor det antatte huset. Ellers var området øst for huset preget av store steinheller (Lillehammer 1972: 61). I tillegg til steinhellene ble det også påvist mange nevestore stein som trolig var brukt som fyll mellom steinhellene slik at det oppstod et fast brolagt område, sannsynligvis en gårdsplass. Steinleggingen gikk inntil steinveggen av det nedbrente huset, men aldri over restene av huset. Det antas derfor at den brolagte gårdsplassen var samtidig med huset (Lillehammer 1968: 8). Broleggingen lå i et ganske solid, kull- og steinblandet lag. I dette laget ble det observert flere tynne linser av trekull, noe utgravningslederen mente trolig stammet fra tidligere branner.

Det kull- og steinblandede laget lå over et gruslag som først ble ansett som steril undergrunn. Imidlertid viste det seg at dette var bare det øverste av en rekke av tilsvarende vekslende sand-, grus- og humusholdige lag. Disse lagene inneholdt et variert funnmateriale og fortsatte ned til den lyse sterile sanden nesten 3 meter under dagens gatenivå. Utgravningsdokumentasjonen gir ikke noen sikker avklaring om sand og grus ble intensjonel deponert på de mørke, humusholdige kulturlagene, eller om sand- og gruslagene kan være resultat av erosjon. Helt nederst i stratigrafien, i den sterile sanden ble det observert en steinrekke. Denne ble tolket som spor etter et naust av ukjent alder (Lillehammer 1968: 9), samtidig viser funn av skjell og sneglehus tydelig at undersøkelsesområdet i tidlig middelalder lå ved sjøkanten og stranden. Dette kan tale for at de avsatte kulturlagene ble påført intensjonelt for å få til en nivåforhøyning i sjøkanten, som ledd i etablering av bebyggelse.

Alle profiler som oppstod ved gravingen av enkeltruter ble dokumentert, samtidig ble forskjellige nivåer av hver rute dokumentert i plan. Imidlertid er de ganske komplekse strukturene i plan som preget den nordlige delen av utgravningsområdet dessverre ikke oppført som egne kontekster i utgravingsdokumentasjonen. Derfor er det heller ikke mulig å tilordne funn til disse anleggene. I tillegg var det moderne forstyrrelser, bl.a. en dreneringsgrøft og en kjeller fra (tidlig-?) moderne tid og vann- og kloakkledninger fra 1900-tallet, gravd ned i lagene fra middelalderen (Lillehammer 1968: 8).

På tross av det arealmessig begrensede omfanget fikk utgravningen på Skagen 3 likevel frem omfattende strukturer fra middelalderen sentralt i bykjernen av Stavanger. Sammen med anleggene gjør den store funnmengden resultatene av undersøkelsen bemerkelsesverdig.

Skagen 3 – funnmaterialet

Som nevnt innledningsvis ble et forholdsvis omfattende funnmateriale innsamlet ved utgravningen av tomten Skagen 3. Utgravningsrapporten nevner over 4000 keramikkfragmenter (Lillehammer 1968: 11) samt mer enn 11000 ubearbeidede beinfragmenter fra forskjellige dyrearter (Lillehammer 1972: 72). I funnlisten i rapporten er 1155 funnnummer oppført, men i den aktuelle funndatabasen som Arkeologisk museum bruker til å forvalte samlingsmaterialet, finnes 1176 enkelte poster med funnmateriale fra Skagen 3. Hvor den store mengden av ubearbeidede dyrebein er blitt av, er per dags dato usikkert. Det er kun få

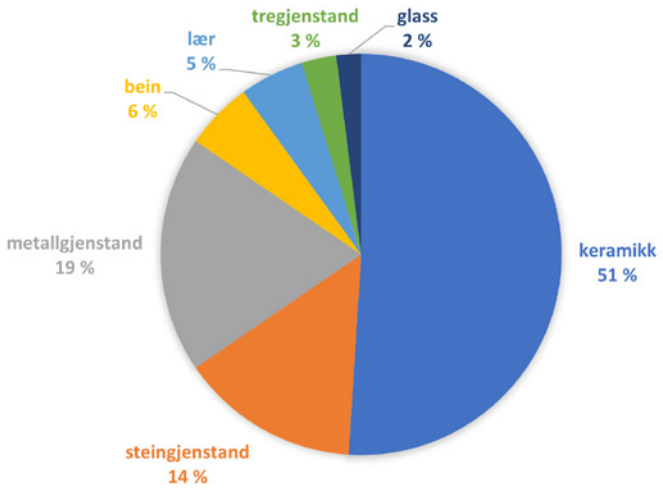

Fig. 2 Diagram over fordelingen av funngjenstander fra utgravingen Skagen 3, basert på antall enkeltfragmenter som er registrert i samlingsdatabasen ved Arkeologisk Museum, Universitetet i Stavanger.
Diagram over distribution of separate find categories from the excavation Skagen 3, based on amount of single fragments as recorded in collection database at the Museum of Archaeology, University of Stavanger.

beinfunn som kan gjenfinnes i Arkeologisk museums samlinger. Beinmaterialet ble imidlertid i 1970 bearbeidet av "… *førstekonservator Haakon Olsen, Zoologisk Museum, Universitetet i Bergen*." (Lillehammer 1972: 72). Hans analyse viser en stor overvekt av primært husdyrbein fra storfe, sau/geit og svin, men også markante innslag av hund, katt, noe høns og reinsdyr. Noen fiskearter ble identifisert da særlig torsk, men også litt lange og sei. Det var relativt lite andre ville dyrearter, men noe bein fra havørn, makrellstørje og steinkobbe indikerer jakt og fangst på sjøen (Lillehammer 1972: 73).

Jeg har ikke hatt mulighet å analysere hele funnmaterialet fra utgravingen, men har ved flere anledninger gjennomgått en god del av funnene av keramikk og glass. Det følgende dreier seg derfor primært om denne gruppen funn. Legger man antallet av enkeltfragmenter som er registrert i samlingsdatabasen til grunn, viser funnfordelingen at keramikken står for over 50 % av de registrerte funnene (fig. 2). Metallobjekter utgjør 19%, mens steingjenstandene er 14% av de magasinerte funnene. Objekter av bein (6%), lær (5%), tre (3%) og glass (2%) forkommer derimot bare i mindre mengder. Nedenfor følger en gjennomgang av de enkelte funnkategoriene.

Keramikkfunn fra Skagen 3

Keramikk er i antall fragmenter den største funngruppen fra utgravningen, som har stor betydningen ikke bare på grunn av mengden, men også på grunn av de kulturhistoriske implikasjoner dette materialet har, noe som ble understreket allerede av utgravningslederen Arnvid Lillehammer (Lillehammer 1968: 11). Allerede i 1972 ble den beskrevet i grove, men presise trekk, som var en imponerende bragd for den unge studenten, særlig datidens forskningsstatus tatt i betraktning (Lillehammer 1972: 63-68). Lillehammer observerte også den påfallende likheten mellom den keramiske sekvensen i Skagen 3 og keramikken fra Bryggen i Bergen. Siden det ikke ble produsert keramikk i Norge i middelalderen, er så godt som alt keramikkmaterialet fra Skagen 3 importert. Bare i de nederste lagene ble det påtruffet enkelte fragmenter av en keramikktype som minner om det sjeldne hjemlige godset fra vikingtiden. Denne beskrives mot slutten av avsnittet.

Mye av keramikkmaterialet kan kun typebestemmes og tilknyttes en utgravningsrute og et stratigrafisk lag, men en detaljert statistisk analyse er ikke gjennomført med tanke på den forliggende artikkelen. I stedet presenteres keramikken i denne artikkelen kvalitativt, der godstyper, form og kronologi beskrives (dvs. de yngste typene fra de øverste lagene presenteres først, de eldste fra nederste lagene sist). Absolutte tall av mengde og detaljerte tilskrivelser til stratigrafiske horisonter gis ikke på nåværende tidspunkt

Kjøkkenkar i glasert rødgods er en stor gruppe i det keramiske materialet fra Skagen 3. Det meste av dette stammer fra lag 1, dvs. det brune humusholdige *hagejordlaget*. Dette er primært trebenspanner og -potter med stjert eller hank. Det forekommer også enkelte panner og potter med flat bunn. Utover det dominerende røde godset, har enkelte kar også et lyst og gulaktig gods. Sistnevnte karakteriserer keramikk laget av leire fra områder i innlandet av Nord- og Østersjøregi-

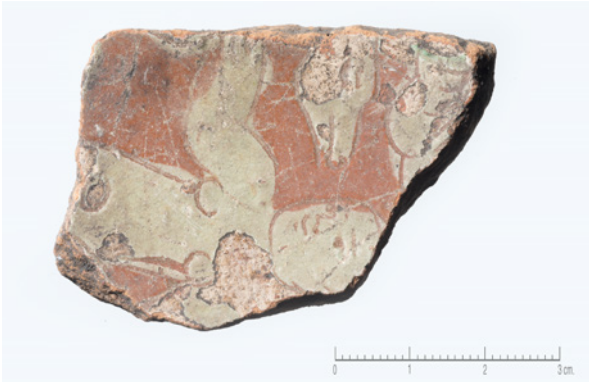

Fig. 3 Bunnfragment av en hornmalt tallerken med innrisset figural dekor i form av en naken kvinne, sannsynligvis bibelsk eller allegorisk fremstilling. Werraware, produsert ved floden Werra i Tyskland i tidsrommet 1570-1630. Foto: Terje Tveidt, Arkeologisk museum, UiS
Base fragment of a slip-decorated plate with Sgraffito decoration, showing a naked woman, probably a biblical or allegorical scenery. Werraware, produced at the river Werra in Germany between 1570-1630.

Fig. 4 Fragment av et fint utført ansiktsmaske av et Bartmannsskrukke fra Köln eller Frechen, omtrent midten av 1500-tallet. Foto: Anette Øvrelid, Arkeologisk museum, UiS
Body fragment with elaborate face of a Bartmann jug in stoneware from Cologne or Frechen, middle of the 16th century.

onen, mens det dominerende røde godset er typisk for keramikk fra de kystnære deler av denne regionen.

Ved siden av enkelte kjøkkenkar, finnes også en rekke fragmenter av dekorerte fat og kar. Blant disse er flere eksempler av det karakteristiske hornmalte *Weserware*. Denne typen ble produsert i flere landsbyer ved den øvre Weserfloden i Nordtyskland i tidsrommet fra omkring 1570 til 1630 og eksportert derfra i store mengder, blant annet til Norge (Demuth 2001). Også to fragmenter av *Werraware* fra samme periode med påkostet figural dekor som er innrisset og hornmalt er blant funnene fra hagehorisonten (se fig. 3).

I tillegg til det nevnte leirgodset ble det også funnet en del steingodsfragmenter fra de øverste jordlagene. Fragmentene er hovedsakelig udekorerte og stammer tilsynelatende fra enkle server ings- eller forrådskar sannsynligvis produsert i Rhinområdet eller ved Duingen i Niedersachsen. Det finnes imidlertid også enkelte fragmenter av rikt dekorerte drikkekar, blant annet ett fra en Schnelle med opprinnelse i Siegburg, med et allegorisk bilde som dateres til andre halvdel av 1500-tallet. Det finnes også et bruddstykke av en stilsikker *ansiktsmaske* fra en Bartmannskrukke fra Köln eller Frechen, sannsynligvis fra midten av 1500-tallet (fig. 4). På samme måte som Werraware-fragmenten viser også det relieff-dekorerte steingodset at finere bordtøy var tilgjengelig og ble brukt av Stavangerboerne mot slutten av 1500-tallet og på tidlig 1600-tall.

Den siste gruppen av tidlig moderne keramikk fra Skagen 3 som vil nevnes, er henholdsvis 24 og to fragmenter av grønn- og svartglaserte ovnskakler. Ovnskakler, og dermed kakkelovner, var lite utbredd i Norge, og funn av ovnskakler er hittil bare kjent fra de store middelalderbyene Bergen, Trondheim og Oslo. De dekorerte renessanse-kakler fra tomten Skagen 3 er derfor bemerkelsesverdige. Flere av de grønnglaserte kakkelfragmentene er påfallende lyst, nesten hvitt i godset, noe

Fig. 5 To fragmenter av glasert leirgods fra Østengland, Grimston ware, med ansiktsmasker, omtrent 1250-1350. Foto: Terje Tveidt, Arkeologisk museum, UiS
To fragments of glazed earthenware with face masks from East-England, Grimston ware, c. 1250-1350.

som blant annet karakteriserer kakler fra områder ved Leipzig og Wittenberg sentralt i Tyskland på 1500-tallet.

Tydelig senmiddelalderske funn fra sent 1300- og 1400-tallet finnes i liten grad blant materialet fra Skagen 3, men det er enkelte bunnfragmenter av skjenke- eller drikkekar i lys steingods fra Siegburg stammer fra krukker eller begre som dateres til perioden mellom c. 1350 og 1500. (Roehmer 2014: 32-70). Siden fragmentene er svært små er det usikkert om dette er rester etter J*acobakanner*, trakthalskrukker eller andre typer kar, men godset og utformingen av bunnen er uansett svært likt Siegburg steingodset.

I alt ble omtrent 125 fragmenter av forskjellig steingods funnet ved utgravningen, majoriteten ser ut å stamme fra udekorerte kar fra tidlig moderne tid. Men det finnes også 13 fragmenter av engobert nesten steingods som ble produsert i landsbyene Bengerode og Coppengrave i det sørlige Niedersachsen i Nordtyskland på 1200-tallet (Demuth 2023: 182-184). Alle de 13 fragmentene stammer sannsynligvis fra skjenke- eller drikkekar, men fragmentene er svært små. Enkelte funn lå tilsynelatende i sin primære kontekst i huset som antas å ha brent i bybrannen fra 1272. Dette viser at innførselen av denne typen steingods til Stavanger må ha begynt allerede i annen halvdel av 1200-tallet. De fleste fragmentene av steingodset fra Niedersachsen ble imidlertid funnet i det omrotede lag 1, og anses være redeponert.

Et stort antall keramikkfragmenter ble funnet i brannlaget fra bybrannen i 1272. Enkelte østengelske keramikktyper med lyst til grått leirgods med utvendig grønnlig glasur, er særlig iøynefallende. Den største gruppen blant disse er *Grimston ware* som ble produsert i landsbyen Grimston i Norfolk, sørøst i England, det viktigste pottemakerisentrumet i denne delen av landet (Green 2018: 129). Landsbyen med disse keramikkverkstedene ligger bare 12 km fra kystbyen King's Lynn som var den viktigste havnebyen i England for handel med Norge i middelalderen. Også blant funnene fra Bryggen i Bergen dominerer andelen av Grimston ware i funnkontekstene fra 1200- og tidlig 1300 tallet (Lüdtke 1989: 22; Demuth 2023: 233, Tabelle 7). Funnene fra Skagen 3 i Stavanger følger dermed et allerede etablert mønster. På grunn av den sterke fragmenteringen kan krukkenes form ikke bestemmes, men ettersom mange av fragmentene har de karakteristiske ansiktsmaskene tyder det på at krukkene i Stavanger stort sett var av samme typer som de som er kjent fra Bergen (fig. 5).

Utover keramikken fra Grimston, finnes også en rekke fragmenter av østengelsk glasert leirgods som *developed Stamford*, *Scarborough ware* og muligvis også *London brown*, som alle også finnes i materialet fra Bryggen i Bergen (Blackmore & Vince 1994: 32). Det nøyaktige antallet av funnene, tilordningen til bestemte stratigrafiske lag og en sikker identifikasjon av produksjonsstedet var imidlertid ikke mulig å fastslå for denne typen i Skagen 3-materialet fra Stavanger.

Ved siden av det engelske glaserte leirgodset, finnes også fragmenter av typer glasert

middelalderleirgods fra forskjellige andre produksjonsregioner. Et lite antall fragmenter av lyst leirgods med utvendige gule glasurflekker ble mest sannsynligvis produsert i Andenne ved Maas-floden i det sørlige Belgia. Tilsvarende ble funnet i lag fra sent 1100- og tidlig 1200-tallet på Bryggen i Bergen i (Demuth 2023: 234, Tabell 8).

Minst to fragmenter av en type rikt dekorert glasert leirgods fra høymiddelalderen, den såkalte *Rouen ware* fra byen Rouen ved Seine elven, nord i Frankrike, ble funnet i Stavanger. Rikdekorert fransk leirgods av denne og andre typer fra 1200- og 1300-tallet finnes også blant funnene fra Bryggen i Bergen (Deroeux *et al.* 1994).

Den siste gruppen av rikt dekorert, glasert leirgods fra høymiddelalderen funnet på tomten Skagen 3 er enkelte fragmenter av utvendig glasert rødgods med flerfarget, delvis pålagt, dekor i form av blomster og annet. Denne keramikken blir i Norge vanligvis betegnet som *sørskandinavisk*, og et kjent produksjonssted ligger ved Farum Lillevang på Sjælland i Danmark (Liebgott 2001). Om de dekorerte rødgodsfragmentene fra Stavanger ble fremstilt i et pottemakeri i Danmark eller et annet sted i Østersjøregionen er foreløpig uavklart.

Fra de eldste lagene på tomten Skagen 3, dvs. under restene av det nedbrente huset, ble det funnet en del fragmenter av et lyst, uglasert, hardbrent leirgods, som er dekorert med brun eller rød maling. Tradisjonelt betegnes dette som *Pingsdorf keramikk* (Keller 1995). Denne typen danner en betydelig andel av keramikken fra 1100- og tidlig 1200-tallet fra Bryggen i Bergen (Lüdtke 1989). At de Pingsdorf-aktige fragmenter ble funnet under brannlaget fra 1272, omtrent midt i de vekslende sand-, grus- og humuslagene ved Skagen 3 i Stavanger passer godt med denne dateringen.

Primært fra de nederste lagene fra Skagen 3, stammer også en annen stor gruppe keramikk: de mange fragmentene av uglasert, redusert brent og grått leirgods. Dette er relativt sett den største gruppen av keramikk fra funnstedet. Samtidig er *grågods* en nokså komplisert kategori å forholde seg til siden keramikk av denne typen ble laget i store deler av det sentrale og nordlige Europa fra 1100- til 1500-tall, enkelte steder enda lengre. Sannsynligvis ser vi i materialet fra Stavanger primært fragmenter av kuleformede kokepotter produsert forskjellige steder i Danmark eller Nordtyskland på 1100- og 1200-tallet. Et påfallende krummet handtak i godt brent leirgods med nesten metallisk, gråaktig overflate, er karakteristisk for såkalt *Paffrath* keramikk fra den navngivende landsbyen Paffrath. Håndtaket kan derfor stamme fra keramikk som ble produsert i den viktige pottemaker-regionen i nærheten av Bonn ved Rhinen i Tyskland.

I Skagen 3-materialet finnes også to randfragmenter av kulepotter av mest sannsynlig såkalt engelsk *Shelly ware*, kjent i store mengder fra Bergen (Blackmore & Vince 1994: 48). Denne typen keramikk er magret med knuste skjell. Den skjellmagrede keramikken fra Skagen understreker at Stavanger hadde nær tilknytning til Nordsjøen og det vestlige Europa.

Den siste gruppen av keramikk som vil omtales her består av omtrent 20 fragmenter svært grovt, ujevnt brent og handlaget leirgods. Der formene kan bestemmes, minner de om bolleformede kar med innbøyet munning vanlig blant vikingtidens keramikk i Nord-Jylland og andre deler av Nordsjøområdet (Hougen 1993: 34). Fragmentene fra Skagen 3 stammer fra lagene under huset som brant i 1272 og er derfor sannsynligvis noe eldre, trolig fra 1100 eller tidlig 1200-tall. Både dateringen og om denne grove keramikken ble importert eller fremstilt lokalt er uvisst. Det er også uvisst om fragmentene ligger i urørte eller omrotete, eldre lag. Det finnes enkelte eksempler på lignende kar i vikingtidskontekster på Nordjæren (Meling 2023: 115), men siden det ellers ikke finnes noen indikasjoner på keramikkproduksjon i Norge mellom 600- og sent 1600-tallet, kan disse grove, bolleformete karene fra Jæren muligens være de eneste sporene etter middelaldersk keramikkproduksjon i landet. Det kan imidlertid heller ikke utelukkes at karene ble importert. Mulige opphavssteder er Nord-Jylland, eventuelt Skottland og *vesterhavsøyene*, som Orkney og Shetland. For å finne svar på disse spørsmålene, er ytterligere undersøkelser og bruken av naturvitenskapelige analyser som ICP-MS nødvendig.

Metallfunn fra Skagen 3

Selv om metallobjekter utgjør en god andel av funnmaterialet, er ikke dette materialet blitt analysert ennå. Majoriteten av metallfunnene er i tillegg til spiker og nagler også ubestemmelige fragmenter av jern eller kobberlegering. Det er også blitt funnet to fiskekroker, flere nøkler og knivblad i jern, samt enkelte fragmenter av bronsegryter. En

fingerring i bronse med innlagt glass er funnet i brannlaget noe som daterer den trolig til 1200-tallet. Dessuten er det funnet i alt tre sølvmynter. Den yngste ble preget under Christian 7. i 1788, mens de to andre sølvmyntene ble preget under Erik av Pommern i første del av 1400-tallet. Myntene ble allikevel funnet i lag 1, *hagelaget*. At eldre materiale ble funnet i yngre stratigrafiske lag viser tydelig at lag 1 er omrotet.

Steinfunn fra Skagen 3

Det er blitt funnet i alt omtrent 150 fragmenter av baksteheller av særlig kleber og skifer. Baksteheller, altså flate stein med tilhogde overflater, er meget karakteristiske funn i norske middelalderkontekster. De ble brukt til å bake flatbrød, men også til å steke andre matvarer. De flate steinene ble utvunnet i forskjellige steinbrudd og derfra eksportert til forbrukerne i Norge (Baug 2017). Fragmenter av kleberkar, bygningsdeler og grove oljelamper av kleber er også blant funnene fra Skagen 3 i Stavanger. Dessuten finnes også flere garnsøkker av kleber, noe som indikerer betydningen av fiskeri i kystbyen Stavanger. En annen liten gruppe gjenstander i kleber er fragmenter av støpeformer for smågjenstander av sannsynligvis kobberlegering, tinn eller bly. Sammen med forekomsten av smeltedigler viser denne funngruppen tilstedeværelsen av finsmeder i Stavanger. Fragmentene av smeltedigler finnes primært i de eldste lagene på funnstedet.

Beinfunn fra Skagen 3

Som nevnt tidligere i artikkelen ble det funnet svært mange dyrebein underveis i utgravingen av Skagen 3-tomten. Beina ble artsidentifisert ved Zoologisk museum i Bergen (Lillehammer 1972: 72), men hvor de er oppbevart i dag er dessverre ukjent. Det fantes også en god del bearbeidet bein og til dels flotte beingjenstander. Blant annet ble rundt 20 kammer og kamfragmenter funnet i lagene under huset som brant 1272 samt i de påfølgende sand- og gruslagene. En praktfull dobbeltkam med bronsenagler og innbuet endeparti (fig. 6) tilhører type D1 (Flodin 1989). Slike er funnet på folkebibliotekstomten i Trondheim i lag datert fra 1175 til 1600 (Flodin 1989: 124.). Tilsvarende kammer er også funnet i Oslo og Bergen, og Sigurd Grieg daterte formen fra midten av 1200-tallet og yngre (1933: 239-240, fig. 206). Utover de dominerende dobbeltkammene, finnes også noen

Fig. 6 Dobbelt trelagskam av reinsdyrgevir med bronsenagler og innbuede endepartier. Foto: Cora Oschmann, Arkeologisk museum, UiS
Three layered comb made from reindeer-antler with bronze-rivets.

enkeltkammer fra Skagen 3, to av disse er over 25 cm lange, den ene med et innrisset runealfabet (Lillehammer 1972: 62, fig. 12).

Da det ikke bare er funnet ferdige kammer, men også flere emner og omtrent 70 bearbeidede gevirfragmenter, kan det virke som om det har vært kamproduksjon på tomten eller nær Skagen 3. Eventuelt kan også to spillebrikker og en terning i bein knyttes til denne håndverksproduksjonen. Andre nevneverdige beinfunn er fire til dels vakkert dekorerte beinnåler og en rørknokkel som har en innrisset runeinnskrift med navnet "SIGURDR".

Lærfunn fra Skagen 3

I nedre del av stratigrafien under det brente huset, ble en rekke lærfragmenter funnet i flere humusholdige lag imellom grus- og sandlagene. Dette er sannsynligvis skomakeravfall, blant funnene er det også en nesten komplett sko (fig.7). Skoen har et lavt overlær med en splitt i midten, sannsynligvis skulle skoen festes på foten med en reim, men det finnes ingen synlige festeanordninger, noe som tyder på at skoen aldri ble ferdigstilt. Lave reimsko uten pynt dominerer i skomaterialet fra handelsstedet Borgund på Sunnmøre (Haugen *et al.* 2023: 93). Også blant funnene fra Bryggen i Bergen opptrer denne typen hyppig (Larsen 1992: 36, 39). Lignende skotyper var også blant de mest utbredde i store deler av det nordlige og sentrale Europa gjennom middelalderen (Larsen 1992: 53). I hanseatiske handelssteder både ved kysten og i innlandet er denne typen sko utbredd og ty-

Fig. 7 Nesten fullstendig lav sko med overlær og såle. Foto: Cora Oschmann, Arkeologisk museum, UiS
Almost complete low-laced shoe with upper leather and sole.

pen dateres fra midten av 1200- til tidlig 1300-tall (Volken *et al.* 2020: 77). Skoen fra Skagen 3 ser dermed ut å være et ganske tidlig eksemplar som indikerer en tett integrering av Stavanger i felles europeiske skomotetrender.

Trefunn fra Skagen 3

I lagene under det nedbrente huset ble det også funnet en rekke tregjenstander. En tallrik gruppe blant trefunnene er såkalte pølsepinner, små runde trepinner som er spiss i begge ender og som sannsynligvis ble benyttet til å tilberede pølser, eller annen kjøttbearbeidelse, muligens som en tidlig form for gatemat? Det ble også funnet mange pølsepinner på Bryggen i Bergen som der tolkes på samme måte (Hansen 2007). Som i Bergen, er pølsepinnene og det øvrige trematerialet, som trenagler og fragmenter av laggede trekar, primært funnet i lag fra 1100-tallet, noe som delvis kan forklares med bedre bevaringsforhold for tre i lavere, fuktige funnlag.

Glassfunn fra Skagen 3

Det ble funnet et bredt spektrum av forskjellige glassfragmenter, både fra drikkeglass, flasker og vindusglass på Skagen 3. En overflatisk gjennomgang viser at det meste trolig stammer fra 1500- til 1700-tallet. Glassmaterialet er sterkt fragmentert, men det kan likevel identifiseres mange *stjerter* av forskjellige typer vinglass, delvis med slipt og pålagt dekor. Vin eller brennevin var sannsynligvis det opprinnelige innholdet i de mange solide, tykke bunnfragmentene av flasker som er funnet. Vindusglass foreligger delvis i form av ruteformede fragmenter, som tyder på bruken av vinduer med smårutet vindusglass i blyinnfatning. De hadde altså vinduer som slapp inn naturlig lys her i den sentrale delen av middelalderbyen Stavanger.

Kun få drikkeglass fra Skagen 3 kan typologisk dateres til middelalderen. Til gjengjeld er to små glassfragmenter fra denne undersøkelsen noe av det mest eksklusive materiale som er blitt funnet i Stavanger. Selv om dette er små fragmenter, er det tydelig at de stammer fra glassbegere, som er karakteristisk for glasshåndverkets blomstringstid i Mamelukk-imperiet i Syria og Egypt i annen halvdel av 1200- og første halvdel av 1300-tallet (Kenesson 1998: 46). Ett av disse er tydelig preget av sterk varme og ble funnet i det nedbrente huset. Det andre, et randfragment, ble innsamlet fra lag 1 sammen med tidligmoderne glassfragmenter. De to fragmentene er imidlertid entydig bruddstykker av ett eller flere kar i klart glass med pålagt farget glassdekor og rester etter forgyllning (fig. 8).

Det brente fragment av islamsk gullemaljeglass kan direkte knyttes til brannen av huset på Skagen 3 og bybrannen fra 1272. Et fragment av et beger

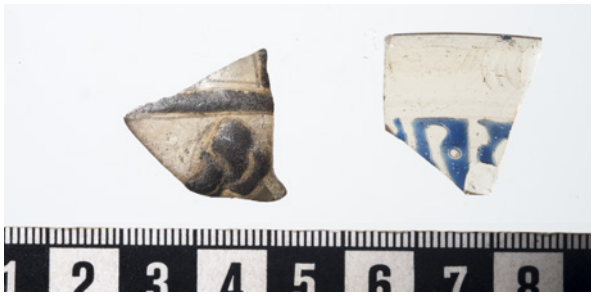

Fig. 8 To fragmenter av islamsk gullemaljglass. Til venstre sekundært brent fragment funnet i brannlaget fra 1272. Til høyre randfragment med uleselige rester av arabisk innskrift med spor av gullemalj mot blå glass. Foto: Terje Tveidt, Arkeologisk museum, UiS
Two fragments of islamic gilded enameled glass. To the left, a secondary fired fragment, found in a fire layer from 1272. To the right a rim fragment with un-readeable remains of an Arabic inscription with traces of gold enamel and blue glass.

i blått glass fra Lübeck Alfstraße med en randdekor som ligner det ubrente randskåret fra Skagen 3 dateres til omkring midten av 1200-tallet (Steppuhn 2014: 202, fig. 9), mens et annen beger islamsk gullemaljglass fra Lübeck Königstraße 32 blir datert til tredje kvartal av 1200-tallet (Steppuhn 1993: 483). Fragmentene av gullemaljeglass fra Stavanger føyer seg dermed godt inn i en rekke fragmenter av slike glass i flere europeiske byer, fra annen halvdel av 1200-talet (Baumgartner & Krueger 1988: 120-123).

Gullemaljglass av liknende typer finnes i små mengder forskjellige steder i Nord-, Vest- og Sentral-Europa. De finnes primært i kontekster som kan knyttes til samfunnets øverste klasser. Ved en kartering av islamske gullemaljeglass i Norden ble fragmenter fra Stockholm, Helsingborg, Visby, Sigtuna og to andre steder i Östergötland oppført (Steppuhn 1993: 482, fig. 3). Senere ble det også henvist til enkelte funn fra Åbo i Finland og Gamla Lödöse i Västra Götaland (Haggrén 2000: 14). I alt finnes det altså i underkant av ti funnsteder av slike glassbegre i Norden og i Norge er det etter min viten til nå ikke kjent andre funn av islamsk gullemaljglass. Spor etter slike drikkebegre viser at beboere fra Skagen 3 etter alt å dømme må ha tilhørt en elite som hadde tilgang til eksklusive glass. Det fjerne produksjonsstedet av disse skjøre karene understreker det langtrekkende nettverk som ligger bak distribusjonen av disse kostbare drikkeglassene.

Skagen 3 – vurdering og perspektiver av det arkeologiske materialet

Gjennomgangen av materialet fra Skagen 3 viste at resultatene fra denne utgravingen er ganske omfattende og bidrar med viktig kunnskap om Stavanger i middelalderen. Dette på tross av at undersøkelsen foregikk for over 50 år siden. For å få frem mer detaljerte og ikke minst kvantifiserbare informasjoner må materialet imidlertid bearbeides mer inngående, blant annet bør en rekonstruere stratigrafiske kontekster og funnforhold bedre. Dessuten vil materialet med fordel kunne analyseres med moderne naturvitenskapelige metoder, for å avklare proveniens, bruk med mer. Mer inngående analyser vil bidra til å styrke kildeverdien av et eldre arkeologiske materialet.

Diskusjonen rundt bydannelsen i Stavanger, som er nevnt i introduksjonen berører tema som fremvekst av urbanitet, et tema som nå er blitt viktig i norsk og nordisk middelalderforskning (Brendalsmo *et al.* 2009). Resultatene fra den gamle utgravingen Skagen 3 kan bidra med viktige fakta til diskusjonen av karakteren av norske byer i middelalderen. Funnene vitner om Stavangers sosiale og økonomiske funksjoner, f.eks. om betydningen av handverk i byene for befolkningen i omlandet, eksemplifisert ved skomakeri (jfr. Helle 2009: 251; Holt 2009: 240). De påviste sporene av metall-, lær- og beinproduksjon, og ikke minst keramikk og glass, fra Skagen 3 må tas i betraktning når Stavangers rolle i nettverkene for distribusjonen av forskjellig gods blir diskutert.

Funnet av store mengder regionale åkerprodukter som i det brente huset på Skagen 3 kan tolkes dithen, at stedet ble brukt til å samle avgifter fra bøndene i omlandet i form av jordbruksprodukter. Disse funnene fra brannlaget fra 1272 understøtter dermed oppfatningen av en norsk elite i middelalderen som baserte seg på natural- heller enn pengeøkonomi ved innhenting av skatter og avgifter fra avhengige jordbrukere (Holt 2009: 243). Uansett er funnet av store mengder korn fra Jæren på Skagen 3 en sterk indikator for byens rolle i distribusjonen av regionens avlinger og understreker betydningen av relasjonene mellom by og omlandet.

Funnene av enkelte bein av store dyr som

av steinkobbe, makrellstørje og havørn er som beskrevet ganske uvanlig. Dette er dyr som kan ha inngått som bytte ved jakt og fangst som var mindre preget av matauke, men hellere som et elitistisk syssel, passende for samfunnets elite. Mens adelen andre steder i Europa brynet seg på storviltjakt i skogen, var eliten på Jæren, som var så godt som avskoget i middelalderen, kanskje henvist til jakt- og fangstturer på sjøen?

Muligens kan restene etter kakkelovner som ble importert fra områdene rundt Wittenberg, altså kjerneområdet i den lutherske reformasjonen, ses i sammenheng med innflytelse fra den nye, lutherske geistligheten som kom til Norge og Stavanger, i første halvdel av 1500-tallet. Skagen 3 fremstår dermed som en tomt i midten av byen, som bærer preg av ha hatt forbindelse med en geistlig elite i flere hundre år.

Utover nærheten til domkirken og havnen som indikerer tomtens prominente plassering i middelalderens Stavanger, understreker også de eksepsjonelle glassfunnene i form av islamsk gullemaljeglass at personer med meget høy status kan knyttes til tomten. Fragmenter av islamsk gullemaljeglass er kjent fra forskjellige steder i Europa, men utelukkende i kontekster som kan knyttes til samfunnets høyeste lag (Baumgartner & Krueger 1988, 120; Haggren 2000: 13). Et nesten komplett beger av denne typen, som kan gi et inntrykk hvordan begeret fra Stavanger en gang så ut, ble funnet i Lübeck sammen med andre funn som vitner om et meget rikt hushold (Steppuhn 2014: 201-202).

Disse menneskene var åpenbart involvert i langtrekkende handelsnettverk som sikret dem tilgang til importerte luksusvarer. Dette vises også i forekomsten av rikt dekorert keramikk fra Rouen i Frankrike, som kan knyttes til importen av fransk vin (Deroeux et. al. 1994). Den internasjonale handelen som keramikkmaterialet vitner om, foregikk på 1200 og tidlig 1300-tallet i stor grad på skip eid av den lokale eliten i Stavanger (Helle 1975: 165-170). En mer dyptgående analyse som inkluderer funnene fra Skagen 3 vil kunne bidra med innsikt i utviklingen av handelsmønstre i Nordsjøområdet i løpet av middelalderen. Det er påfallende at det finnes få funn fra senmiddelalderen på Skagen 3, mens denne perioden er preget av store funnmengder og den sterke innflytelsen av Hansaforbundet i funnmaterialet fra Bergen (Lüdtke 1989: 23; Helle 1995: 688). Hvis ikke dette skyldes bevaringsforhold på tomten Skagen 3, så kan det tyde på at forandringer i handelsmønster fra andre halvdel av 1300-tallet førte til, at Stavanger mistet en del av betydning som internasjonalt handelssted til fordel for direktere seilas mot Bergen.

Samlet viser gjennomgangen av materialet fra Skagen 3 at det i arkivet og i samlingen til Arkeologisk museum ligger et rikt materiale med stort potensiale. Selv over 50 år gamle utgravinger er høyst relevante kilder til moderne middelalderforskning. Ved hjelp av nye metoder og teoretisk tilnærming kan materialet bidra til ny forståelse av middelalderens mennesker og samfunn, ikke bare i en regionalt, men også i en nordisk og europeisk sammenheng. Å sette søkelyset på disse perspektiver som en reaktivering av eldre magasinmateriale kan gi, var intensjonen bak presentasjonen av utgravingen Skagen 3 i Stavanger fra 1968. En dypgående analyse av funnene og strukturer fra denne undersøkelsen, som diskuterer både teoretiske og metodiske aspekter grundigere enn det som er mulig i dette bidraget, vil kunne bli et kjærkommet fremtidig bidrag til nordisk middelalderforskning.

Summary

Stavanger, Skagen 3 – the largest excavation in a little-known Norwegian medieval town

Stavanger, the center of Norway's third largest metropolitan area, has a rich history stretching back to the 12th century, when it served as an important episcopal seat with roots in the viking period. It has been the subject of intense research, particularly with regard to its origins and development. This article presents the results of the largest archaeological excavation in the town, carried out in 1968, which has contributed valuable findings to the understanding of Stavanger in the Middle Ages. The results of this excavation were previously published in the local museums proceedings, with very limited availability for a broader audience.

The site in question, on the property Skagen 3 is strategically located between the cathedral and the harbor, which was a distinguished plot in the medieval town. The excavation uncovered cultural layers with a thickness of approximately 2 meters, containing a variety of finds, including pottery, bone, metal and glass.

The preservation conditions of the medieval layers were good and the excavation revealed a number of constructive features, including a burnt wooden floor belonging to a house. The prominent fire layer can most likely be identified as a devastating fire from 1272, which is mentioned in historical sources. The discovery of large quantities charred grain suggests that parts of the building may have been used to store agricultural produce. Traces of a courtyard were also uncovered, as well as a row of stones that may have been part of a boathouse.

The excavation resulted in extensive finds, including pottery, bones, leather, metal and stone artifacts. The pottery shows a clear connection with imported material from various European production sites, indicating Stavanger's role in international networks. It resembles the ceramic sequence from larger Norwegian towns, such as Bergen and Trondheim.

Pottery is the most numerous group of artifacts from the excavation, with fragments of earthenware and stoneware, covering the period from the 12th to the 17th century. The finds include decorated pottery from France, Germany and England, testifying trade and cultural exchange. In the earliest phases gray earthenware dominates, but also some glazed Andenne ware is represented, as is red-painted earthenware in *Pingsdorf-style*. East-Anglian glazed earthenware, such as Grimston ware is dominating in the 13th century, but also some fragments of German stoneware and near-stoneware could be identified. Polychrome Rouen-ware from Northern France is present, but just in a few fragments. Late medieval types, such as Siegburg stoneware is only present in small numbers. Early modern pottery, on the other hand was found in large numbers. Aside of numerous fragments of kitchen vessels in red earthenware, also stovetiles and various decorated slipwares, such as Weser and Werra could be identified.

There were numerous bones from domestic livestock, but also some specimens from wild animals, such as eagles and seals as well as a variety of saltwater fish was identified. Fewer in numbers, were worked fragments, which may indicate local production of craft products. Bone artifacts were predominantly combs of various types, but also needles and some gaming pieces. Remarkable is a bone fragment with a runic inscription of the forename “Sigurd”, one of the earliest individuals we know by name from Stavanger!

The metal finds include nails, keys and fragments of bronze pots, as well as a finger ring dating to the 13th century. This material provides insight into craftsmanship in the Middle Ages, which is also proven by molds for casting of non-ferrous metals, made of soapstone.

The glass fragments from Skagen 3 include predominantly early modern drinking and window glasses. Extraordinary are two fragments of gilded and enameled Islamic glass beakers from the late 13th century, which are the hitherto only pieces of this special vessels which have been detected in Norway. This suggests that the residents had access to exclusive luxury goods which is found at sites populated by the most privileged classes in medieval Europe.

The finds from Skagen 3 provide a deeper understanding of Stavanger's role as a trading center and city in the Middle Ages. They reveal a multifaceted social and economic structure in which trade, crafts and agriculture were key elements. Further research and modern analysis of the material can help shed light on the city's development and its connections to the European trade network.

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Konseptuell arkeologi i byplanlegging[1]

Av Torgrim Sneve Guttormsen

Innledning

I politikk om byplanlegging er det et uttalt mål at fremtidens byer skal være mer teknologisk smarte, mer miljøvennlige grønne og blå, mer økonomisk sterke og mer sosiokulturelt gode miljøer å bo i og besøke. I et nylig ferdig europeisk forskningsprosjekt som jeg ledet ønsket vi at politikerne også skulle se den store ressursen som ligger i de tidskapsler av historie og kulturarv i byene for å oppnå sine bypolitiske mål, og vi lanserte i den forbindelse begrepet *den dype byen* (Fouseki *et al*. 2020).[2] Med forskningsprosjektet ønsket vi en dreining av fokus fra å oppfatte urban endring som utelukkende en trussel mot kulturarv, til å utforske hvordan urban endring eller transformasjon produserer kulturarv og setter oss i stand til å tenke i nye retninger om den urbane kulturarvens rolle i dagens byutvikling. De fleste byer består av fragmenterte spor fra tidligere faser av byen, men til og med historiske såkalte *intakte* byer som gamlebyen i Tallin eller Bergstaden Røros er endret ved nøye planlagte bevaringsstrategier der noen elementer tas bort og der andre elementer beholdes og endog tilføres for å skape det historiske *intakte* bybildet (Guttormsen & Fageraas 2011; Guttormsen & Skrede 2022). Dynamikken mellom det som glemmes og huskes av byenes temporalitet er med andre ord fagteoretisk og politisk situert og definert. Utfra dette utgangspunktet ligger kimen til en erkjennelse om at arkeologien, ikke minst byarkeologien, har et potensiale til på konseptuelt vis å bidra i ny urban design og bærekraftig stedsutvikling. I dette kapitlet skal jeg redegjøre for arkeologiens konseptuelle potensiale i byplanlegging utfra min tidligere forskning om emnet (Guttormsen 2020).

Arkeologi er godt å tenke med om byen

Å tenke i arkeologiske termer har bidratt teoretisk og konseptuelt, så vel filosofisk som poetisk, med å forstå verden. Kjente eksempler er innen psykologi som arkeologisk metafor på dybden og lagene i menneskets ubevissthet (om Sigmund Freud i Thomas 2009) og innen sosiologi som metafor på å avdekke idéhistoriens epistemologi ved begrepet *Kunnskapens arkeologi* ([Foucault 1969] 2012, for dens motpol *Ukunnskapens arkeologi* se Chahboun 2019). Arkeologi er en ressurs for å forstå ikke bare fortiden, men også nåtiden og fremtiden. Sagt med arkeologen Christopher Smith:

> *Archaeology is not about the discovery or indeed the stewardship of the past, but about working on what remains. This puts much more emphasis on archaeology as an intellectual and philosophical engagement with the world, rather than a producer of new knowledge through continuous excavations.* (Smith 2016: 279).

Den komplekse urbane arkeologiske konteksten stimulerer også vår intellektuelle og filosofiske involvering med byer (Guttormsen 2020: 35-36). Det handler om den dype, temporære og transformative karakteren ved urban kulturarv som er materialisert i byenes arkeologiske lag og fragmenterte spor. Max Page (2001) gjør for eksempel et poeng av at det som definerer New York i dag og dens kulturarv er et resultat av prosesser forstått som en *kreativ destruksjon* over tid. Urban transformasjon definerer slik sett kulturarvsverdier synonymt med den heterogene byens mange og allsidige fortidsspor. I dette ligger også et verdisyn relatert til det arkeologiskes estetiske uttrykksform forbundet med fragmenterte spor eller fragmentering som prosess, hvilket vil si det vakre i det som er ødelagt eller ikke lenger intakt eller perfekt, jfr. kinesisk Confucius og japansk Wabi-sabi-filosofi, og om vestlig tenkning om ruiner, fragmentering og forfall (Guttormsen 2000: 38). Å tenke med urban arkeologi handler slik sett om å verdsette den heterogene byen fremfor primært den homogene byen (jfr. Dehaene & De Cauter 2008). Med den heterogene byen i tankene er det nærliggende å bringe inn Michel Foucaults konsept *heterotopia* (Foucault [1967] 1984). Ifølge Foucault er heterotopier en type steder som avviker fra hverdagslivets steder. Kinoer, hageanlegg, gravsteder, biblioteker og museer er heterotopiske, mener Foucault. Museer har for eksempel gjenstander innhentet fra en rekke steder med en kronologisk og geografisk variert kontekst samlet i en gjenstandssamling på et felles sted. Arkeologiske steder, spesielt urban arkeologis komplekse kulturarv fra mengden av tidligere byer i dagens by, kan forstås utfra en tilsvarende heterogen konseptuell ramme (jfr. Samuels 2010: 68).

Arkeologiske konseptualisering basert på den heterogene byen

Forfall og oppløsning

Det finnes de steder med heterotopiske kvaliteter basert på det som kan kalles et arkeologisk konsept om forfall og oppløsning (Guttormsen 2020: 40-42) og som er kjennetegnende ved forlatte industritomter og havner, ruiner og steder under bevisst eller ubevisst ødeleggelse. Disse stedene er forbundet med arkeologiske spor etter en materialitet ute av bruk og som er i ferd med å gå i oppløsning og forsvinne. Steder under forfall og oppløsning har sin verdi ved å representere prosesser under nedbrytning (det som flaker av, råtner og faller sammen) og som symboliserer det tapte og forlatte, svundne og forgjengelige ved tilværelsen. I arkeologisk terminologi som tangerer byarkeologi, industriell arkeologi og samtidsarkeologi har forfall og oppløsning som et arkeologisk konsept i tenkning om postkonserveringspraksiser kommet stadig mer i fokus (f.eks. Olsen & Pétursdóttir 2014; Pétursdóttir & Olsen 2014; DeSilvey 2017; McAtackney & Ryzewski 2017). Blogger på nettet, slik som *Modern ruins, urban archaeology and the post-industrial sublime* (Rapp 2010) og *Kingston lounge: guerrilla preservation and urban archaeology* (Ference 2013), tar for seg hvordan forfalne bygninger, ruiner og urbane nettverk fra en nær fortid slik som offentlige forlatte bygninger, kinoer og teatre ved sine uttrykksformer preget av forfall og oppløsning har en verdi i dagens samfunn (se også Sollis 2005, 2013). Den svenske arkeologen Patrik Nordström (2002) bruker sine erfaringer som arkeolog under sin byvandring i Stockholm når han benevner de arkeologiske sporene som *Berättelser om övergivanden* (historier om forlatthet). Nordström observerer de fragmentariske elementene i et bylandskap som har forsvunnet, for eksempel relikte jernbanespor som ikke lenger er i bruk. Nordström beskriver sporene som uttrykk for en alltid tilstedeværende arkeologisk by i dagens Stockholm som fremmer verdier som er anekdotisk historiefortellende gjennom sin fragmentariske og heterogene urbane kulturarv, og med kvaliteter som er åpen for fortolkning og som kan fortelle mange historier, om både fortiden og om vår samtid.

Som samtidsfortelling vil et fokus på kulturarv forbundet med stadier av forfall og oppløsning kunne bidra med en diskusjon om hva som bevares og hva som gradvis forsvinner, og om hva som er våre bekymringer og håp om bærekraft og robusthet ved vårt samfunn i dag og for fremtiden (Sollis 2013). Arkeologisk konseptuell tenkning om forfall og oppløsning vil videre kunne ha stor innvirkning i byplanlegging, for eksempel som en del av konsepter som den grønne byen eller *the forest city* der sammenhengen mellom naturarv (det års-sykliske med naturens forfall og vekst) og kulturarv (med elementer av forfall, transformasjon, aldring og patina) er samsvarende verdier. Tradisjonelt er koblingen mellom natur og kultur gjenkjennelig i urban parkplanlegging der naturens nedbrytning og ruinromantikk går hånd i hånd som et estetisk ideal. I tråd med Sollis' bekymringer og håp om bærekraft og robusthet ved vårt samfunn fremmer koblingen mellom den dype og grønne byen et helseaspekt (sosial bærekraft, velvære) utfra en plan om at natur- og kulturarv bidrar med å skape gode levelige og helsebringende byer (jfr. Phillips 2017).

Stratigrafi

Steder med heterotopiske kvaliteter som fremmer et arkeologisk konsept om *stratigrafi* bygger på fundamental tenkning i arkeologiens (og geologiens) forståelse av temporalitet og tidsdybde avsatt i de lagvise sedimentene etter natur- og kulturprosesser som for eksempel kan gjenfinnes ved å foreta en kirurgisk snitt i form av en arkeologisk utgravning ned i byens dype lag (Thomas 2004). Stratigrafisk tenkning skiller mellom det som er under og det som er over, ofte i et komplisert bilde av penetrerende lag i hverandre, men som er basert på logisk strenge sekvenser og lineær rekkefølge av tidslag over hverandre, som en fargerik sandwich av kompakt materialhistorie. Stratigrafi er et konsept om den mangelagdelte byen – alle tidligere byer under dagens by - på samme sted, opplevd i et øyeblikksbilde fra den arkeologiske utgravningskanten.

Å tenke med stratigrafi som design vil være en ressurs i byplanlegging (Guttormsen 2020: 47-49). Denne opplevelsen av å se ned i det dype lagdelte snittet av ødeleggelse og fornyelse (den *kreative destruksjonen*) av tidligere byer, brukes i museumsutstillinger, for eksempel på Bryggen Museum i Bergen i Norge, hvor museumsrestauranten er bygget som et stratigrafisk lag over lagene fra utgravningene av middelalderbyen (se fig. 1). Den

Fig. 1. Darwin Ecosystème-prosjektet ligger blant varehusene til en tidligere militærbrakke i Bordeaux, Frankrike. Området utnytter ruiner og forfall som estetiske kvaliteter for å skape et hipt og trendy rom som byr på ulike fritidsaktiviteter (inkludert kafeer, butikker og fasiliteter for skating). Noen områder er farlige og inngjerdet, men det er likevel spennende å utforske områdene som er tilgjengelige for allmennheten. Foto: Torgrim Sneve Guttormsen, NIKU.

The Darwin Ecosystème project is located among the warehouses of a former military barracks in Bordeaux, France. The area exploits ruins and decay as aesthetic qualities to create a hip and trendy space that offers various leisure activities (including cafés, shops and facilities for skating). Some areas are dangerous and fenced off, but it is nevertheless exciting to explore the areas that are accessible to the public.

Fig. 2. Stratigrafisk design brukt i utformingen av en museumsbygning, eksemplifisert ved Bryggen Museum i Bergen, Norge. Foto: Torgrim Sneve Guttormsen, NIKU. *Stratigraphic design in the context of a museum building, exemplified by Bryggen Museum in Bergen, Norway.*

besøkende kan fra restauranten se ned i byens dype lag. I byplanlegging vil arkeologisk konseptuell tenkning om stratigrafi også inngå i ideer om den mangelagdelte byen – *the multi-layered city* (architizer.com 2024) - som ikke bare omfatter den lagdelte historiske byen under bakkenivå, men også konseptuell tenkning om den horisontalt delte byen over bakkenivå med lag på lag av menneskelige miljøer i høyden.

Palimpsest

Konseptet palimpsest ligner konseptet om stratigrafi ved at begge begrepene tematiserer lagdelingen av bylandskapet. Begrepet kumulativ palimpsest "is close to stratigraphy, where different traces and interfaces between them are interpreted in terms of different events that can be either successive or contemporaneous." (Lucas 2012: 90).

I studiet av historiske manuskriptfragmenter er palimpsest spor av tekst som blir etterlatt (vanligvis på papyrus eller pergament) etter å ha blitt skrapt eller vasket av, slik at siden kan brukes på nytt. Etter som tiden går blir spor etter den tidligere skriften synlig sammen med den nye teksten. Konseptet palimpsest har fått innpass i urbane studier og definerer en distinkt heterotopisk konseptualisering av kulturarv (Busà 2010: 158-159; Bartolini 2014). Minnesteder og minnelandskap som utgår fra palimpsest utgjør "… overlapping multivocal landscapes, each seeking to defend — discursively and materially — its own historical memory as 'bona fide'" (Muzaini & Yeoh 2016: 188). Tidligere og nyere minner kjemper med andre ord om oppmerksomheten, men minner blir samtidig omarbeidet og omskrevet til et fornyet blandet innhold bestående av nytt og gammelt (Rowlands & de Jong 2008: 133). Minner fra ulike perioder blir sammenflettet slik at en periode huskes gjennom linsen til en annen (Shaw 2002: 15). Denne tilnærmingen til palimpsest som minnekonsept peker på nøkkelaspekter ved det som har blitt teoretisert som *the heritage of absence* (Frers 2016), det materielles tilstedeværelse gjennom sitt fravær slik for eksempel sporene fra en nedrevet bygning fortsatt er synlig som avtrykk på veggen til en bygning som fortsatt er stående.

Fraværets estetikk ved palimpsest som konseptuell uttrykksform er brukt i både interiør- og arkitekturdesign så vel i formidling av byenes historie og fragmenterte kulturarv (Guttormsen 2020: 44-47). Koblingen mellom arkeologi og palimpsest har dessuten blitt en kilde for urban design. En utstilling av arbeidet til den greske arkitekten og skribenten Aristide Antonas ved SAM, Swiss Architecture Museum i Basel, kalt *Protocols of Athens*, fokuserte for eksempel på den dype byen som *idealisert søppel fra en tapt tid*, og Antonas visjon *8 /15 Omonoia Square* viste et system av arkeologiske felt forklart som en *lagdelt palimpsest av byens historie* utformet ved rulletrapper for folk med tilgang til Athens undergrunn (Steiner 2015).

Collage

Et annet kulturarvskonsept basert på heterotopiske elementer kan forklares ved begrepet collage. En collage er en samling av forskjellige elementer plassert på samme sted, men som ikke nødvendigvis har noen sammenheng med hverandre (Guttormsen 2020: 42-44). Konseptet ble mye diskutert etter publiseringen av *Collage City* (1978) av arkitekturhistorikerne Colin Rowe og Fred Koetter. Bokens tittel refererer til hererotopisk byplanlegging, det vil si å gjøre en by levende gjennom å verdsette mangfoldet og variasjonen av byens materialitet. Rowe og Koetter utfordret modernismens ensartethet, og tok tenkning om collage – med dets ikke-lineære syn på historie og ikke-totaliserende byplanlegging – som et middel til å gi nytt liv til urbane designpraksiser. Collage innebærer en omorganisering av flere historiske preferanser ved å omskrive det inn i ny plansammenheng. Collage har nærliggende preferanser til begrepene bricolage og brecciation. Sistnevnte konsept har for eksempel vært en ressurs i fornyet stedsutvikling i Roma ved bruk av arkeologisk materiale på stedet der "elements that have no common origin whatsoever can be organically fused together and form a whole" (Bartolini 2014: 523).

Et eksempel på bruken av collage som kulturarvskonsept er gjenbruk av eldre elementer i nye bygninger, såkalte *spolia* (latin for spoils, kastet, søppel). Gjenbruk av byggestein til nybygg er i likhet med gjenbruk av dekorative skulpturer i nye monumenter en eldgammel og utbredt praksis som arkeologer kjenner godt til i sin utforsking av gamle bygninger. Praksisen med å fjerne stein som har blitt brutt, kuttet og brukt i en bygget struktur for å kunne bruke den andre steder har også et designuttrykk i dagens arkitektur (Brilliant & Kinney 2011). Resultatet er en miks - en collage - som inneholder omorganiseringer av flere historiske referanser. En utforskning av varianter av collagestilen brukt som et kulturarvskonsept ville være et verdifullt verktøy i byplanlegging.

Konklusjon: konseptuell arkeologi i byplanlegging

I denne korte artikkelen har jeg hentet kunnskap fra min tidligere forskning om emnet og vist hvordan konseptuell arkeologi gjennom kategoriene forfall, stratigrafi, palimpsest og collage på hver sin måte angir tilnærminger til hvordan byarkeologi – de fragmenterte spor og den lagdelte byen fra fortiden - kan vær en ressurs i byplanlegging. Gjennom bruken av arkeologi som en konseptuell verktøykasse vil det være mulig å argumentere for hvorfor et konsept er bedre enn et annet i et konkret byplanprosjekt og dermed gi veloverveide faglige begrunnelser for de valg som gjøres i planleggingen. De fleste byer er i konstant endring og etterlater suksessivt som følge av den historiske transformasjonen en fragmentert kulturarv. I dette åpnes det for en erkjennelse om at fragmentert kulturarv og den dype byen med sine heterogene og heterotope kvaliteter utgjør verdier med stor brukspotensiale i byplanleggingen.

Summary

Archaeology in urban environments is more than excavation practices, objects from the past hidden in the soil and the uncovering of deep urban histories; it is also a way of thinking and reflecting about the past. As such, the discipline contributes to the creation of concepts that can stimulate discussion on how to use the past as a heritage resource in developing urban environments in present-day cities. A key aspect for understanding the sustainability of cities based on archaeological conceptual thinking is to examine the transformative and trans-temporal nature of cities over time, their complex processes and driving forces, and how urban heritage as a product of the transformation and layering of cities are values which can be activated as a resource in present urban development. This article focuses on the distinctive character of urban archaeological heritage when enabled as a conceptual tool in urban placemaking. Theoretical concepts such as *dissolution*, *decay*, *collage*, *palimpsest*, and *stratigraphy* are discussed as planning concepts which each, in their own way, define approaches towards implementing the traces of the past in a variety of cityscapes.

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Noter

1 Denne artikkelen utgjør for det vesentligste en norsk kortversjon av tidligere utgitt engelskspråklig bokkapittel med tittelen «Archaeology as Conceptual Tool in Urban Planning» (se Guttormsen 2020).

2 JPI-CH prosjektet "Curating Sustainable URBAn Transformations through HERItage' (CURBATHERI–Deep Cities", 2019-2022, see https://curbatheri.niku.no/ and https://www.deepcities-toolbox.unifi.it/

Mellan stad och förstad: framväxten av ett historiskt landskap i skuggan av Slussen i Stockholm

Av Jan Kockum

Inledning

I Stockholms hjärta, mellan Gamla stan och Södermalm, finns en av regionens viktigaste kommunikationsnoder med uppskattningsvis 400 000 personer som passerar dagligen. Här trängs järnvägen och tunnelbanan med bil-, cykel och gångvägar och här möts sjön Mälaren och Saltsjön, den senare en vik av Östersjön. I nodens centrum finns Slussen, överbryggad av ett system med broar – en förutsättning för att mötet mellan land- och sjövägarna ska kunna fungera. En första sluss, den så kallade Kristinaslussen, invigdes 1642 och med den möjliggjordes en säker passage förbi den annars alltmer stridare strömmen som förband insjön med havet. På grund av slitage och förändringar i trafik och topografiska förutsättningar har slussen byggts om med ungefär hundra års mellanrum. År 2016 påbörjades den senaste ombyggnationen, något som inneburit enorma markingrepp både på land och under vatten. När det senast begav sig, på 1930-talet, gjordes endast begränsade arkeologiska insatser, i enlighet med de förutsättningar som dåtidens lagstiftning gav. Nu har arkeologer fått följa ombyggnationen del för del och för första gången beretts möjlighet att dokumentera hela området (fig. 1). Processen har inneburit stora utmaningar då det arkeologiska arbetet har gjorts under flera års tid parallellt med rivningsarbete och nybyggnation. Men i skuggan av att den nya Slussen har tagit form så har också ett nytt historiskt landskap vuxit fram.

Nu och framöver ser vi stora infrastrukturella projekt som kräver ett nära samarbete mellan byggherrar och arkeologiska aktörer och en förståelse för varandras roller i samhällsbyggnationen. Föreliggande artikel kan ses som en sorts metastudie av Slussenprojektet med syfte att belysa arbetet med att integrera de arkeologiska momenten i den övriga byggprocessen, samt att presentera några preliminära resultat.

Historik

Kontrollen av inloppet till Mälaren har länge anförts som ett av de viktigaste incitamenten till anläggandet av Stockholm (Ex Ödman 1987: 116 ff). Omkring år 1000 hade tidigare farleder, på grund av landhöjningen, grundats upp och lämnat Söderström och Norrström, på vardera sidan om det som kom att bli Stadsholmen, som de enda kvarvarande segelvägarna in i Mälaren (Söderlund 2016: 172 f). I Norrström har man också funnit rester av spärrar i form av pålar och stenkistor som kan dateras till perioden 960–1010, således långt äldre än de första beläggen för staden (Ödman 2023: 195).

Första gången Stockholm som stad förekommer i de historiska källorna är som dateringsort i två brev från år 1252 (*SDHK*: 664, 665). Stadens äldsta delar rymdes på Stadsholmen (stadsdelen Gamla Stan utom Helgeandsholmen och Strömsborg); sjöfarten genom Norrström var vid den här tiden ännu kontrollerad av pålspärren. Det strategiska läget vid den spärrade vattenleden mellan Mälaren och Saltsjön och vid Göta landsväg, den gamla huvudleden mellan Södermanland och Uppland, gynnade stadens utveckling.

I ett privilegiebrev för Klara kloster, daterat till år 1288, omtalas den äldsta stadsmuren för första gången (Hasselmo 1981: 21). Vi får härmed en tidig beskrivning av stadens topografiska utveckling. Redan under 1300-talet utvidgades sannolikt stadsområdet på Stadsholmen, och det som kan kallas Strandmuren uppfördes. Muren följde strandlinjen på respektive sidor om holmen och i söder fanns (inre) Södertorn (även kallat Söderport), den äldsta porten vid stadens södra infart. När tornet uppfördes är inte närmare känt, men på norra sidan av Stadsholmen, vid Norrbro, fanns ett motsvarande försvarstorn omnämnt 1280, det är således rimligt att anta att även Södertorn fanns vid denna tid.

Senare tillkommer ett yttre Södertorn – så att den bro som fanns över Söderström fick försvarstorn på båda sidor. Detta har skett före 1427, då både ett Södertorn och ett Yttre torn omtalas. Under Gustav Vasa och i mitten av 1500-talet utökades försvaret vid Söderström ytterligare, varvid försvarsanläggningen kring yttre Söderport byggdes ut och ett nytt Söderport uppfördes (Rondellen). Vid stadens södra infart fanns nu således tre portar, eller försvarstorn, varav det tidigare yttre Södertorn nu kom att kallas Mellantornet (Hansson 1956: 18 f, 172 ff).

När Söderströms militärstrategiska roll minskade ökade dess betydelse för samfärdsel och handel, men eftersom Mälaren hade högre vattennivå än Saltsjön behövde Söderström regleras för att underlätta för sjöfarten. År 1634 påbörjades omvandlingen av Lilleström, den södra armen av Söderström, till en kanal för en slussanordning efter samtida holländsk modell. Platsen gjordes i ord-

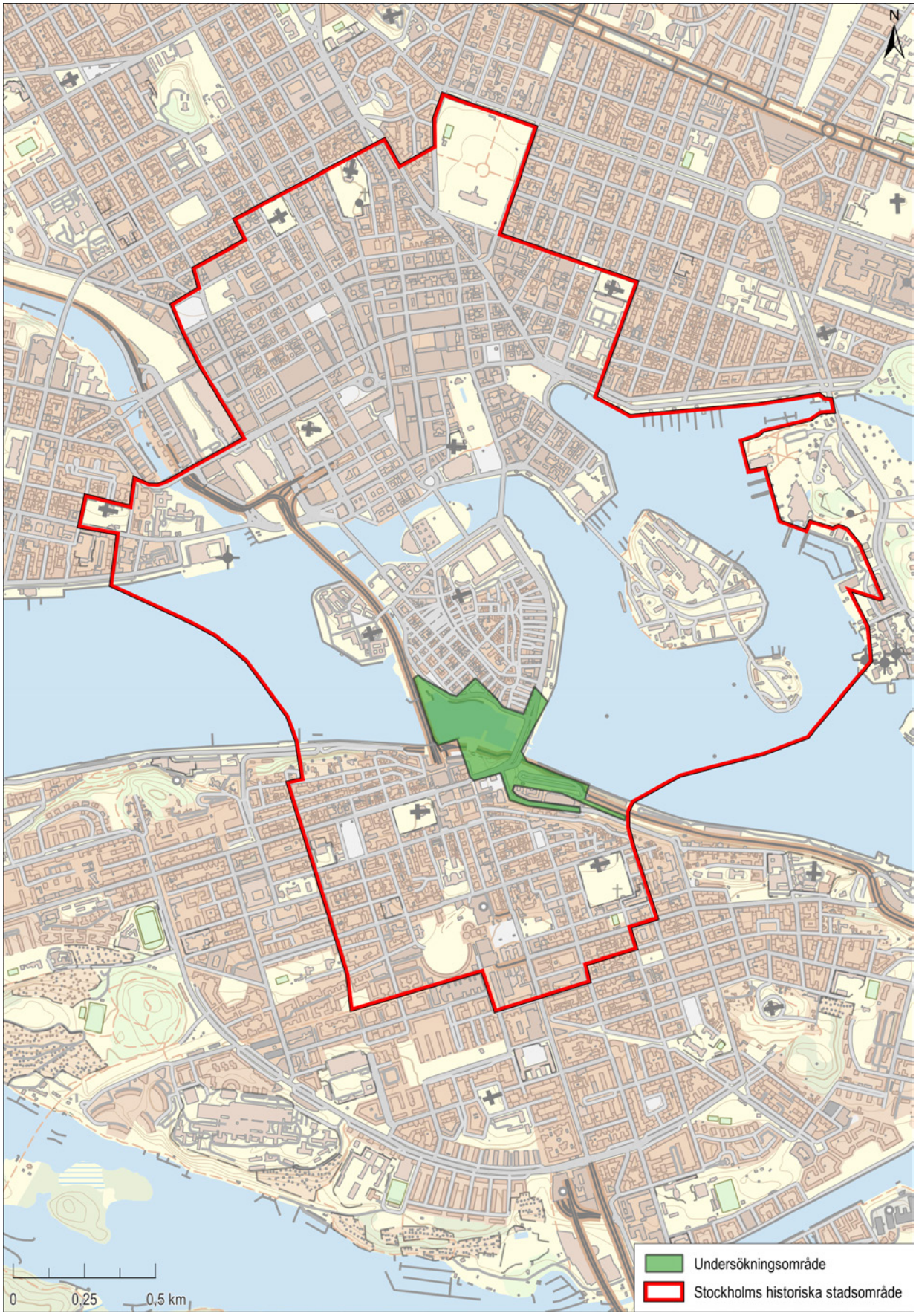

Fig. 1. Stockholms historiska stadsområde (stadslager L 2015:7789) och undersökningsområdet markerat. Karta: Fastighetskartan, skala 1:20 000, bearbetning av Elin Evertsson, Arkeologikonsult.
The extent of Stockholm historical town area, and the archaeological site marked.

ning och Inre och Yttre Söderport jämnades 1637 med marken. Träkassunen för slusskanalen bogserades på plats år 1638, därefter bekläddes dess botten och väggar med från Holland införd ”blocksten, klinksten och siment”. År 1642 var slussen, tillägnad den snart myndiga drottning Kristina, redo att invigas (Abrahamsson 2004: 25 ff.).

I början av 1700-talet hade Kristinaslussen, eller Södersluss som den också kallades, blivit sliten och föråldrad. En ny och större sluss konstruerades på samma plats av Christopher Polhem (fig. 2). Denna öppnades år 1755 (Abrahamsson 2004: 33 ff.).

Knappt hundra år senare hade turen kommit till att byta ut den då föråldrade Polhemsslussen. År 1846 påbörjades arbetet med det som kom att heta Nils Ericsons sluss, nu dock i den norra armen av Söderström, den så kallade Kvarnströmmen. Den nya anläggningen innebar en förändring av hela näset mellan Gamla stan och Södermalm. Bebyggelsen vid Kvarnströmmen – det vill säga kvarnarna, en grönsaksbasar vid Gröna gången, slakt- och fiskarehuset samt hela fiskehamnen – revs. När den nya slussen invigdes 1850 fanns den kanal som ingick i Polhems anläggning kvar, dock överbyggd av en ny basar (Lorentzi & Olgarsson 2005: 22 ff.). Polhems slusskanal fylldes igen först inför uppförandet av Karl Johanslussen åren 1931–1935, den anläggning som nu har fått ge plats åt Victoriaslussen.

Fig. 2. Polhemsslussen 2020. I bild syns källaren till 1700-tals slussens sydöstra torn under utgrävning. Tornet ingick i ett av två tornpar, mellan vilka en fällbro tillät landkommunikation över slusskanalen (Kockum 2024: 66 ff).
Polhemslussen 2020. The illustration shows the basement of the 18th-century lock's south-eastern tower during excavation. The tower was one in two pairs, between which a drawbridge was situated, allowing for communications over the lock canal.

Arkeologi i skuggan av ett jätteprojekt – problem och lösningar

Ombyggnationen av Slussen och den anslutande trafiklösningen omfattar ett område om drygt 100 000 kvadratmeter, eller cirka 2,5% av den fornlämning som utgörs av Stockholms historiska stadslager (fig. 1). Ett projekt av denna storlek innebär ett flertal utmaningar; här ska några av de största belysas.

- *Ett långtidsprojekt*. Det arkeologiska arbetet skulle under lång tid utföras parallellt med ombyggnadsprocessen. Arbete inleddes med en separat undersökning i samband med ledningsomläggningar redan 2013. I huvudsak så har dock undersökningarna pågått mellan åren 2016–2025, med en del mindre schaktningsövervakningar de närmast efterföljande åren.
- *På land och i vatten*. Den antikvarisk-topografiska miljön utgjorde en utmaning, med lämningar både på land och under vatten.
- *Okänd terräng*. Den senaste ombyggnationen av Slussen gjordes på 1930-talet. Vid den tiden genomfördes endast en begränsad arkeologisk dokumentation, främst inriktad på monumentalarkeologi. Bevarandestatusen inom undersökningsområdet var till stora delar därför inte närmare känd.

Ett långtidsprojekt

Slussenområdet som trafiknod, projektets omfattning och den tidspress som förelåg föranledde beslut om *schaktningsövervakning* som normal undersökningsnivå – det vill säga arkeologer följer markingreppen och undersöker och dokumenterar lämningar efter hand som de framkommer. Där lämningar av mer omfattande art kunde förväntas skulle dock separat undersökningsplan upprättas och *särskild undersökning* genomföras, det vill säga en undersökning med riktade och anpassade frågeställningar, undersökningsplan och kostnadsberäkning; där arkeologerna råder över ytan (Länsstyrelsen Stockholm, Förfrågningsunderlag 2015-12-29, 4311-22393-2013). Att schaktningsövervakning genomförs parallellt med byggprocessen säger sig självt, men även de särskilda undersökningarna gjordes till en hög grad parallellt med övrigt arbete eftersom undersökningsområden behövde säkras upp med spont och hammarband, vatten pumpas undan och massor och rivningsmaterial forslas bort.

För en uppdragsarkeolog är rollfördelningen i den antikvariska processen välbekant: i Sverige är exploateringsarkeologin ett trepartsförhållande mellan Länsstyrelsen (myndigheten), byggherren och den arkeologiska utföraren. Arkeologerna agerar efter myndighetsbeslut och ”…byggherren ska säkerställa att undersökningsområdet görs tillgängligt för [undersökaren].” (Länsstyrelsen Stockholm, Beslut 2016-03-18, 4311-22393-2013). För gemene bygg- och anläggningsarbetare kunde det vara svårt att uppfatta skillnaden mellan schaktningsövervakning och särskild undersökning, då allt arbete försiggick samtidigt, vare sig det gällde schaktningsövervakning eller särskild undersökning. Dessutom innebar omfattningen och den långa tiden som projektet pågick en hög omsättning av personal. För att säkerställa ett proaktivt samarbete villkorade Länsstyrelsen att det under hela byggprocessen skulle finnas en arkeologisk samordnare, för att i samråd med byggherren i god tid planera in de arkeologiska åtgärder som behövdes efter hand som byggnationen fortskred. För att även anläggningsarbetarna skulle vara informerade om arkeologin och, vice versa, arkeologerna om anläggningsarbetet fanns alltid en arkeolog på plats vid morgonmöten på byggplatsen. Att skapa ett intresse för arkeologi hos så många som möjligt inom byggprocessen parat med kunskap om rollfördelningen och syftet med den antikvariska processen har visat sig vara ett effektivt sätt att få till ett välfungerande samarbete.

På land och i vatten

Byggarbetsplats och undersökningsområde täckte in både land- och vattenytor, varför undersökningsmetodik fick anpassas. Bottentopografin i Saltsjön och i Mälaren på ömse sidor om Slussen påverkades av muddringsarbeten och omfördelning av massor. Inför detta arbete gjordes en geofysisk kartering med *Side scan sonar*, varvid ett antal lämningar noterades. Dykningar företogs av marinarkeologer från Statens maritima museer på dessa platser. I Saltsjön öster om Slussen påträffades häst- och dragkärror, som dock inte kunde dateras närmare än *t.a.q.* 1900-talets mitt (Hansson & Carlsson 2016a); på Mälarsidan påträffades – från modern tid – fartygslämningar, fisksumpar samt en timmerkonstruktion med okänd funktion (Hansson & Carlsson 2016b).

Muddring gjordes längs med strandlinjen. Undersökningsområdet inom byggprojektet var indelat i rutor om cirka 20×20 meter och till dessa förhöll sig den arkeologiska muddringsövervakningen. Upptagning av muddermassor gjordes i stick om 2 meter och materialet genomsöktes av arkeologer. Metoden kan uppfattas som grov då grävmaskinisten förstås inte kan se under vattenytan. Emellertid ger en GPS ett höjdvärde, vilket gör det möjligt att gräva i jämna stick. Större precision går i detta läge inte att få. Strandzonen utmed Gamla Stan, Södermalm och näset däremellan har fyllts ut genom århundradena och tjockleken på landutfyllningen varierade mellan 3–20 meter. Det fyndmaterial som framkom här var således i första hand sekundärdeponerat, men utifrån fynden går det att få en kronologi över landutfyllningsprocessen och massorna i sig har konserverat en stor mängd föremål i organiskt material.

För att förhindra inträngande vatten vid schaktning inom landytorna hade Stockholms stad beslutat om säkerhetsstopp för schaktarbete vid nivån +0,5 m ö.h. Nedanför denna nivå fanns således behov av spontning och bortpumpning av vatten; också i djupschakten genomfördes vid behov muddring med övervakning. Även om landhöjningen sedan stadens etablering – och den förskjutning av strandlinjen som detta har inneburit – minimerade kulturlagerinslaget under säkerhetsstoppet så gick en del tidig stratigrafi, främst utfyllnadslager, förlorade.

Fig. 3. Exempel på hur historiska källor kan ge en förförståelse för den antikvarisk-topografiska situationen. Utsikt från Brunnsbacken av Johan Sevenbom 1773 (Stadsmuseet i Stockholm, CC BY). I målningens nedre vänstra hörn syns det rundade hörnet av den byggnad som hyste restaurang Pelikan (grönmarkerat) och centralt i målningen syns Södra kokhuset (blåmarkerat). Båda byggnader har framkommit vid undersökningarna i samband med ombyggnationen av Slussen (Foto: Arkeologikonsult).
Examples of how historical sources can provide a preliminary understanding of the historical-topographical situation. View from Brunnsbacken by Johan Sevenbom 1773 (Stadsmuseet i Stockholm, CC BY). In the lower-left corner of the painting, you can see the rounded corner of the building that housed the Pelikan restaurant (marked in green), and in the centre of the painting is the so-called Södra Kokhuset (marked in blue). Both buildings have been excavated and documented during the Slussen excavations

Okänd terräng

Där lämningar av mer omfattande art kunde förväntas skulle schaktningsövervakningen övergå till särskild undersökning, och inför varje sådan skulle undersökningsplan och kostnadsberäkning upprättas. Då det inte fanns möjligheter att utföra arkeologiska förundersökningar var kunskapen om bevarandestatusen begränsad. Men genom historiskt källmaterial – vilket även inkluderar kartor från 1600-talet och framåt, samt konst från 1500-talet och framåt – så fanns en bra förförståelse för platsens antikvarisk-topografiska situation (fig. 3). Efter hand som schaktningsövervakningarna fortskred och särskilda undersökningar gjordes så växte även kunskapen om bevaringsförhållandena i området fram

och tillförlitliga underlag för efterföljande undersökningar kunde upprättas.

Således, inför den sista särskilda undersökningen inom projektet Slussen, på Södermalmstorg, så kunde den stratigrafins omfattning och tidsspann uppskattas utifrån tidigare undersökningar i projektet på en angränsande yta. Och utifrån konst, byggnadsritningar och historiskt kartmaterial var bebyggelsesituationen bekant ner till 1700-talet, och mer schablonmässigt ner till början av 1600-talet. Torget var i norr, mot tunnelbanespåret, ännu delvis avgränsat av vallgravsskoningen från 1540-talet; tågen rusar delvis fram i den gamla vallgraven.

Två meter under den befintliga torgytan framkom så gatubeläggning från 1800-talet och byggnader från 1700-talet och härifrån påbörjades en resa ytterligare sju meter ner och tillbaka till högmedeltid och spåren av den äldsta bebyggelsen i form av en källare (fig. 3).

In fundo dicto suthræmalm – Några preliminära arkeologiska resultat

Den framkomna källaren representerar också en av slussenprojektets största överraskningar. Att det på Södermalm har funnits bebyggelse under medeltiden har varit känt sedan tidigare, men dess genes och ålder har varit omdiskuterad. I ett diplom från 17 juni 1288 omnämns den nya stadsdelen Södermalm – *suthræmalm* – och genom *Bjärköarätten*, den stadslag som gällde för Stockholm fram till mitten av 1300-talet, får vi reda på att stadslagen även inkluderade Åsö – *a Ase* – [det vill säga Södermalm] (*SDHK*: 1407; Holmbäck & Wessén1946: XC11 ff; 458).

Inom den antikvariska verksamheten har man (i brist på säkra belägg) tidigare haft ståndpunkten att det på Åsön kan ha funnits en bebyggelse närmast Gamla Stan, men att den har varit oregelbunden och av sporadisk karaktär. Uppfattningen grundades på skriftliga uppgifter från senmedeltid (Carlsson & Svensson 2019: 415). Gunnar Bolin diskuterade emellertid redan på 1930-talet ordalydelsen ”…in fundo dicto suthræmalm…” i 1288 års diplom i ett större språkligt sammanhang och som geografisk pendang till vad som år 1286 omnämns ”berget Malm”, det vill säga Brunkeberg med omnejd. Två år senare började området kallas Norrmalm, vilket rimligen förutsätter ett samtida Södermalm. Till Norrmalm kan knytas Norrström och Norrbro, vilka även de finner sina motsvarigheter på södra sidan av Gamla stan. Ordet *fundo*/*fundus* avser sannolikt en bebyggelse eller anläggning, som Bolin ville förlägga till området kring Söderström, men även till Tranbodarna ner mot Saltsjön (Bolin 1933: 269 ff). De fram till nu undersökta arkeologiska lämningarna på Södermalm har emellertid inte gått att datera längre tillbaka än till 1500-talet (Svensson 2020: 12 f). Genom de aktuella undersökningarna har delar av en stadsdel, en förstad, dock framkommit med en äldsta bebyggelse från perioden 1270/1280, då den källare som påträffades uppfördes (Bertheau & Kockum *in prep)*. Ett nät med stenlagda gator anpassade efter topografin anlades vid samma tid. Dennas till synes organiska stadsplan existerade i knappt hundra år och vid mitten av 1300-talet skedde en omstrukturering av bebyggelsen med ett nytt gatusystem, sannolikt anpassat till Göta landsväg, och från nu ser vi genom fyndmaterialet en burgen miljö som i materiellt hänseende kan mäta sig med de finaste miljöerna i Gamla stan (fig. 4). Under 1390-talet revs dock bebyggelsen, troligen av försvarstekniska skäl, för att sedan ligga öde i cirka hundra år. I slutet av 1400-talet bebyggdes området igen och nu fanns här magasinsbyggnader och en kålgård inom undersökningsområdet. Inför en annalkande dansk här brändes emellertid denna bebyggelse ner av strategiska skäl. Efter att Vasa blivit kung år 1523 bebyggdes området igen, för att åter rivas när Stockholms försvar utökades på 1540-talet. Från början av 1600-talet har dock området varit kontinuerligt bebyggt (Carlsson & Svensson 2019: 417 ff).

Mellan Gamla stan och förstaden på Åsön har det under hela perioden funnits ett bebyggt näs. Från 1400-talet har tunga befästningar – som skyddat stadens södra port och inloppet till Mälaren – samsats om utrymmet med stadens kvarndrift och fiskehamnar. Efter att försvaret flyttats längre ut från staden sker en omvandling av näset och torget: Kristinaslussen byggs och blir hjärtat i regionens – och delvis rikets – kommunikation och handel. Det viktiga järnet kom emellertid att efter 1662 transporteras genom Gustav Vasas forna vallgrav, som nu kom att kallas Järngraven. Denna blev den nya platsen för stadens järnvåg och omlastningsplats för järn; kring år 1740 stod Sverige för uppskattningsvis 35–40 % av den internationella produktionen (Heckscher 1985 [1941]: 110; Nerman 1936: 11, 18). Kring Kristinaslussen och

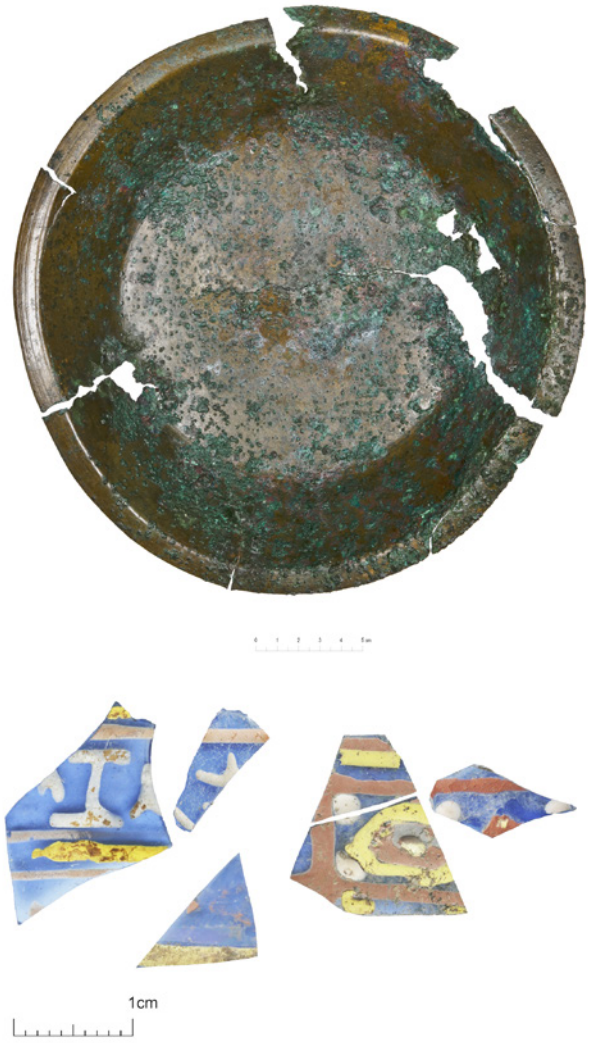

Fig. 4. Exempel på fynd från 1300-talets Södermalm som visar på en burgen miljö. Överst i bild ett handfat i brons, deponerat i en grop täckt av en kalkstensskiva någon gång under perioden 1325–1350 (Carlsson & Svensson 2019: 70). Nederst i bild glasskärvor från en så kallad Aldrevandinbägare, en typ av bägare som tillverkades i Venedig mellan 1250–1350 (Carlsson & Svensson 2019: 68 ff; Haggrén 2019: 10).
Examples of finds from the 14th-century Södermalm indicating a high-status environment. At the top, a bronze basin deposited in a pit covered by a limestone slab sometime during the period 1325–1350. At the bottom, glass shards from a so-called Aldrevandin vessel, a type of vessel that was manufactured in Venice between 1250–1350.

de efterföljande slussarna försvann fortifikationen och ersattes med den lokala kommersen i form av handelsbodar, basarer och ölstugor vid sidan om kvarndriven verksamhet och fiskehamnar.

Avslutning

Det omfattande projektet med ombyggnationen av slussen i Stockholm har inneburit ett stort antal utmaningar, inte minst ur ett antikvariskt perspektiv. Att undersöka och dokumentera ett omfattande historiskt landskap, på land och i vatten, samtidigt med pågående byggnationsprocess har ställt stora krav på samarbete mellan myndighet, byggherre och arkeologisk utförare. Genom både formaliserad och informell kommunikation har förståelse för den antikvariska processen, kunskap om aktörernas roller och med detta ett intresse för arkeologi hos exploatören skapat förutsättningar för ett gott samarbete där arkeologen har utgjort ett naturligt inslag genom de åren som projektet har pågått. I skuggan av den nya slussen har konturerna av ett historiskt landskap vuxit fram.

Summary

Between city and suburb: the emergence of a historic landscape in the shadow of Slussen in Stockholm

Since 2016, the city of Stockholm has been replacing one of the region's most important communication hubs, the so-called Slussen (The Lock). This enormous building site is situated within the historical city area of Stockholm. For this reason, archaeologists have been involved throughout the process, mapping a giant historic topographic jigsaw puzzle.

This paper is a meta-study of the archaeological project. The focus is on the challenges of conducting archaeological excavations within a huge ongoing development spanning over several years. Alongside this, there is a brief presentation of some of the archaeological results.

The expansive building project has presented many challenges from an archaeological perspective. It has involved excavating and documenting

an extensive historical landscape, on land and in water, at the same time as working in tandem with the ongoing construction. This has resulted in a great demand for close cooperation between the authorities, the developer, and the archaeological contractor. There has been both formal and informal communication, continuous reporting regarding the archaeological process, and ongoing discussions about history and archaeology. These have created good conditions for collaboration between all parties involved in the project. The archaeologists have become a natural element on the building site throughout the years.

One of the great achievements of the excavations is the discovery of a 13th-century suburb – in earlier historical research debated, but very uncertain. And between the city and the suburb we have been able to excavate and document a historical landscape emerging in the shadow of The New Lock. At first, it was a heavily fortified isthmus with some civil elements and later a communication hub between the local, regional and international trading routes.

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Archaeology for the West Link project (Västlänken) in Gothenburg

By Emma Nordström, Karolina Müller, Tom Wennberg, Mats Sandin, Andreas Skredsvik and Carina Bramstång Plura

Fortification walls, the Crown's harbour Masthamnen and, not least, nine shipwrecks are some of the discoveries made when archaeologists investigated historical remains of national interest in Gothenburg.

Several large-scale infrastructure projects are underway in Gothenburg; the construction work includes 'the West Link' (Västlänken), with a new rail tunnel and three underground stations (fig. 1). The Archaeologists at the National Historical Museums have carried out excavations since 2012 in conjunction with these projects. Construction of the West Link project began full-scale in 2018 and will continue at least until the end of 2024.

Besides the archaeological fieldwork, the West Link project has also been filled with logistical and communicational challenges related to work in such a large-scale infrastructure project. Despite these challenges, our efforts have already resulted in new knowledge about Gothenburg's earliest history. Below follows three short sections presenting some of these results, and some concluding remarks regarding working in this large project.

Fortification constructions, customs, and a military harbour towards the riverside

Gothenburg was built in the 1620s as a fortified city and underwent modernisations, renovations, and reparations during the following two centuries (fig. 2). Enclosed by a moat, we find fortification features such as canals, and stone and earth walls built upon wooden foundations constructed with planks, cross-laid timbers, and piles. But we also find traces of the first residents — buildings, streets, and objects discarded or lost by the townspeople as they carried out their daily lives here (fig. 3).

In the Kvarnberget area, situated alongside the Göta River, bastions connected by curtain walls with counterforts were built, protecting the town from any hostile ships sailing up the river. During the excavations, remains of these, as well as remains of a pier with an old customs house (fig. 5), and the Crown's harbour referred to as Masthamnen, were documented. Although the town's people used the harbour, it was in fact part of the town's defence, with military equipment and supplies shipped and handled here. Nine shipwrecks were discovered at the bottom of the harbour during the excavations. These provide information that enable us to explore topics such as shipping history, customs, and much more. This new knowledge deepens and gives life to the history of the Göta River's estuary.

The harbour wall was constructed with stone, mainly resting on a clay and soil foundation. Since the harbour was deeper at the entrance, and thus the walls were higher, a proper wooden foundation was needed here. Parallel with the wall, towards the harbour basin, a supporting wooden construction consisting of a row of wooden piles and horizontal planks was found.

In the late 1720s or early 1730s, the northernmost part of the harbour was filled in, using at least three discarded ships as filling material. The remaining harbour was in use until the 1860s when it was filled in, again using ships as part of the filling material. These discarded ships are the ones found during the excavations(fig. 6).

The customs house was on the western side of the harbour entrance. From descriptions in letters written to Gothenburg's magistrate in 1709, 1714, 1728 and 1730 (Gothenburg City Archive), we know the building was rebuilt once or twice due to poor upkeep.

The building was only 44 square meters, containing one room for customs declaration, another for customs funds and documents, and a small chamber for the customs clerk and his family. A new customs house was built in the middle of the eighteenth century. Excavations of the area uncovered parts of a stone foundation and stone floors, which most likely belong to this new building.

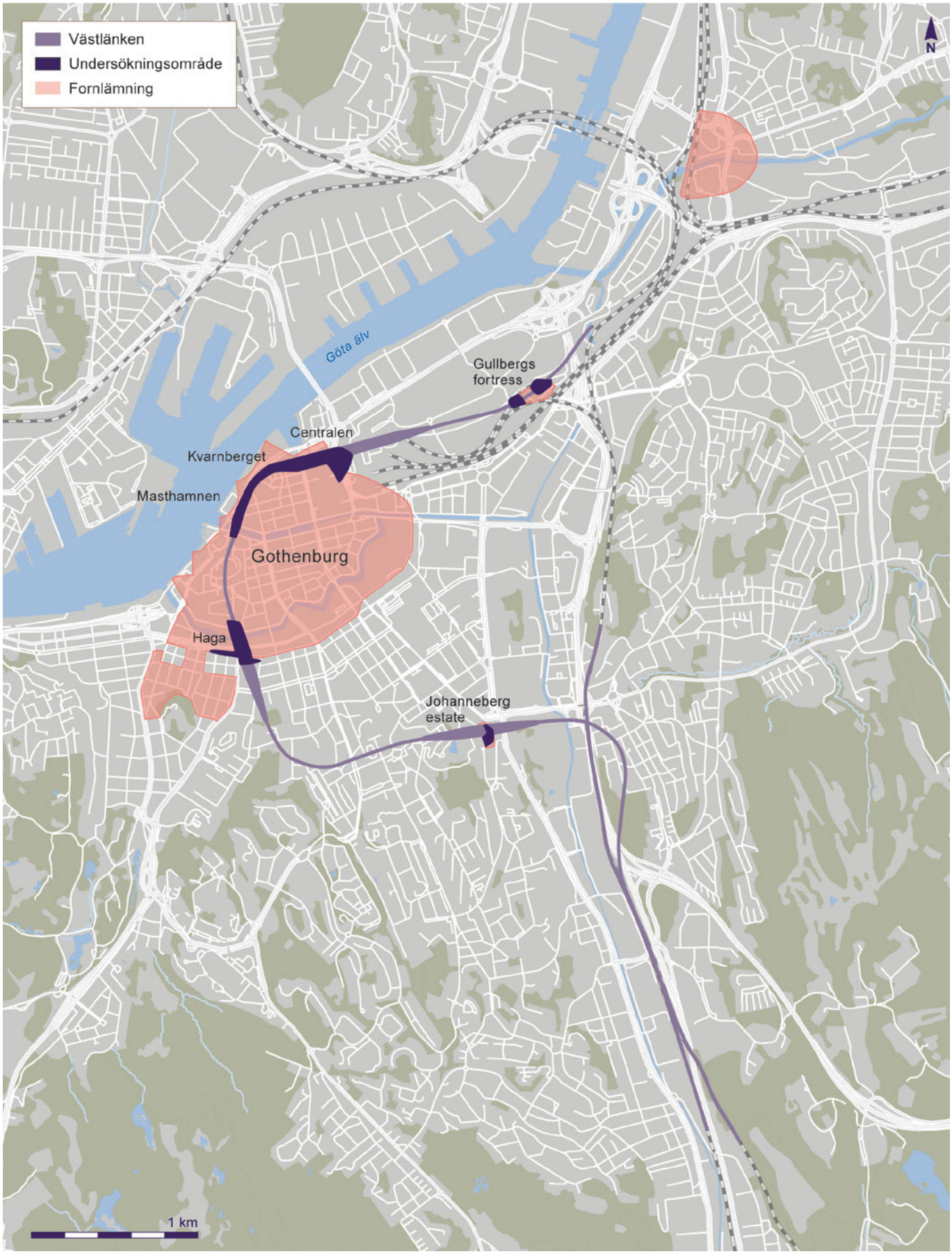

Fig. 1. Map showing the location of the West Link railway line and underground stations, as well as the five separate construction sites Gullberg, Centralen, Kvarnberget (including Masthamnen), Haga, and Johanneberg. Map by Henrik Pihl, Arkeologerna @. (c) Lantmäteriet (PDM).

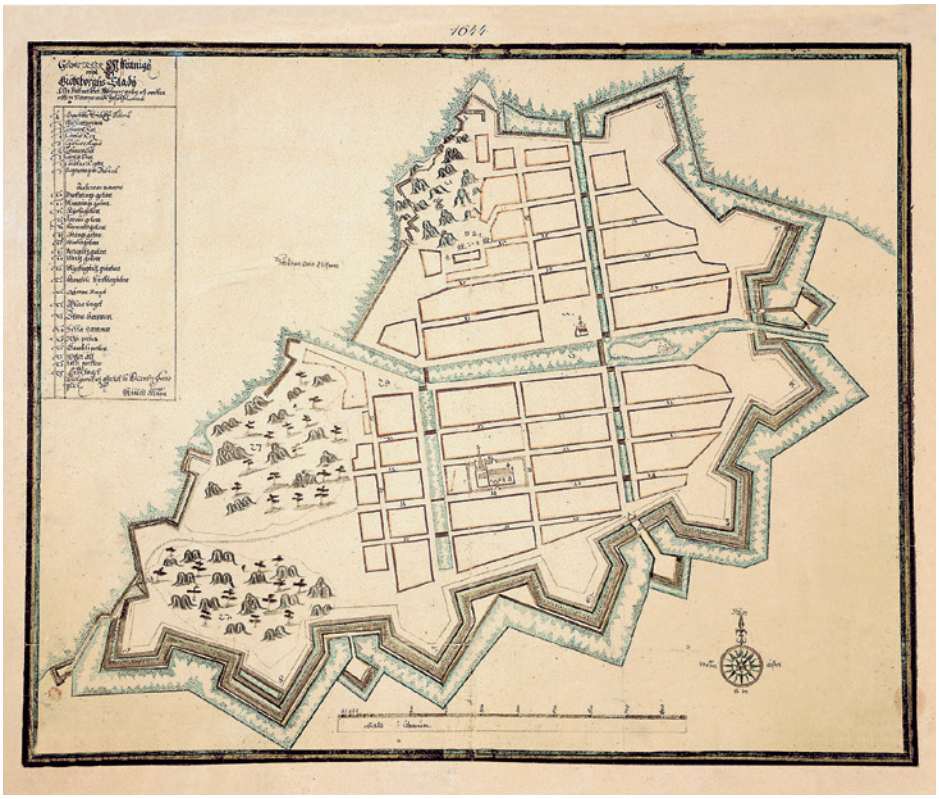

Fig. 2. Historical map of Gothenburg 1644. Property map: Gothenburg city museum.

Fig. 3. Remains of a cobbled street was found, as well as two houses on either side of the street from between 1620 and 1640. Photo: Arkeologerna.

Fig. 4. Objects found on the wooden floors were connected to the households, such as shards from plates and mugs, utensils, haberdashery accessories, dice, and coins. Photo: Arkeologerna.

Fig. 5. The western harbour wall and the remains of the customs house. Photo: Arkeologerna.

Fig. 6. One of the wrecks found during the excavations. It was used as filling material when the harbour was filled in around 1860. In most of this wreck there had been cieling planking, and the keelson and the keelson and mast step is seen in the front ofthe wreck. A single loose bulkhead is visible in the stern, where there was a dividing wall in the cargo space. Photo: Markus Andersson for Arkeologerna.

A Dutch-style bastion in the city district Haga

A simplified description of Gothenburg is that it was built of three generations of fortifications on the inland side. Temporary and simple ramparts with a moat were constructed in a historically traditional style when the town was founded in the early 1620s (fig. 7a and b). A couple of decades later, full-scale fortifications were constructed, including bastions, Dutch-style curtain walls, and faussebraye[1] with a main rampart and a lower defensive wall alongside the moat. This double rampart was over six metres tall and appears to have been constructed in the late 1630s and onwards. It was not until the 1690s that walls replaced this system of ramparts with banks on the inner side inspired by the French style. The only exception was three bastions in the southwestern part of town where the Dutch fortification system was left in place; the bastion Christina Regina in the city district Haga was one of these. Eventually, the fortifications visible above ground were demolished in the first half of the nineteenth century.

The archaeological excavations in Haga encompassed remains of the earliest simple rampart and the Dutch-style double rampart. It was not expected to find the earliest rampart, but it had been encapsulated and protected in the construction of the next generation of fortifications, the bastion of Christina Regina. The bastion was named after the Swedish Queen at the time. The difference in scale of these two generations of fortification is vast, but there are also technical differences in the foundation work of the ramparts. Generally, the ramparts consisted of homogenous clay taken directly from the digging of the adjacent moat. Traces of humus are much more common in the first rampart, most likely since this was the first construction work to be carried out in what was earlier pastureland.

The earlier ramparts from the 1620s were reinforced by stakes hammered into the clay to stabilise the ground, particularly alongside the moat. Bundles of branches were used as support and reinforcement in the ramparts and along the edge of the moat.

Specific methods were used to keep the large Dutch main rampart in place. A row of piles abuts the front of the rampart to hold the weight. At regular intervals, ground anchors had been constructed as transverse timbers through the rampart, held by two piles in the ground at the back of the rampart. Examining the front part of these ground anchors has not been possible. In a limited part of the bastion, we have also recorded a complex system of horizontal timbers functioning as additional reinforcement. This is not present throughout the entire length of the bastion and may have been a method used only in the parts close to the pointed end of the bastion.

It is clear that the first fortification was a relatively simple project in an earlier traditional style, in which the rampart behind the mote was constructed of the earth from digging the mote. The Dutch version was a more complex large-scale project requiring a considerable timber supply and relocation of vast quantities of clay.

Gustavus Primus. A bastion near Gothenburg's central train station

Near Gothenburg Central Station, between numerous modern cables, pipes, and building foundations, recent excavations have unearthed the remains of the bastion Gustavus Primus. As one of thirteen bastions built around the middle of the seventeenth century, it was part of Gothenburg's defensive works, featuring curtain walls and moats encircling the town. The remains that were found include both parts of the bastion walls and the moat on its eastern side. To highlight Gothenburg's historical narrative, some of these structures will be used in the landscaping and architecture of the new Västlänken Central Station building and its surrounding areas (fig. 8).

Parts of the flank and the face were found towards the western side of the bastion. These walls were built of stone and rested on a wooden foundation. Behind the walls was a wooden foundation for an earthen bank used to strengthen the outward-facing stone wall and absorb the impact of any cannonballs fired at the bastion. Now that the archaeological work is finished, some of the stones from the walls will be used to mark the contours of parts of the former bastion.

Parts of the face were discovered on the eastern side of the bastion. The remains consisted of the base of an earthen embankment resting on a wooden foundation with cross-laid timbers. This side of the bastion never had a stone facade. Parallel to the outer edge of the embankment, a row of wooden piles with a retaining wall were found.

Fig. 7a,b. The remains of the earliest simple rampart and a moat from the 1620s.
Property map: Gothenburg city museum.

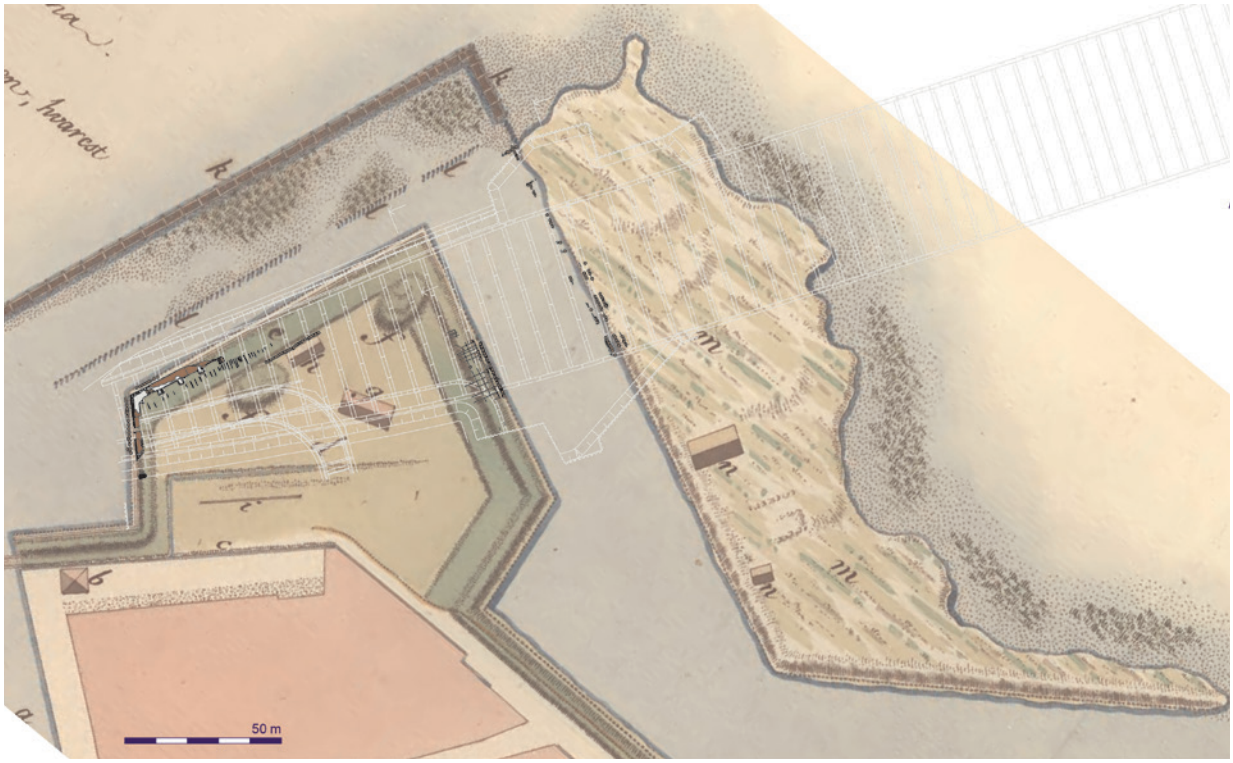

Fig. 8. Map from 1773 with the excavated structures marked out. The West Link tunnel is shown in white. Property map: The National Archives.

Fig. 9. The western side of the bastion Gustavus Primus, with a stonewall and wooden foundation. Photo: Markus Andersson for Arkeologerna.

Fig. 10. Excavation work taking place in part of the Kvarnberget area. A section of a curtain wall with counterforts can be seen near the centre of the picture. It is a good illustration of how the excavations were carried out in the middle of a busy town. Photo: Arkeologerna. Photo: Arkeologerna.

This construction was built to provide structural support, prevent erosion, and serve as the western edge of the moat (fig. 9).

Forty meters to the east, the opposite edge was found, cut through the side of an islet. The oldest construction consisted of a low clay embankment. It coincides with the location of the new train station, and within the building, the old moat edge will be marked out on the floor. Preparations for this and other visualisations of the historical remains have been made in collaboration between the archaeologists, the architects designing the station, the city council, and other authorities. Hopefully, the results will help residents and visitors to Gothenburg engage with the town's historical narrative.

Complexity, flexibility and stamina

The West Link project (Västlänken) is a huge and complex undertaking. The construction work is substantial, with eight kilometres of railway line through a large city, as well as three new underground stations. Six kilometres of the line will cut through rock, and the remaining two kilometres will cut through post glacial clay in open shafts. The logistical and technical difficulties involved require well-functioning procedures and expertise.

All this construction work is carried out in five separate major areas simultaneously, run by five different consortiums involving a multitude of companies, subcontractors, and specialists; altogether, this requires an excess of creativity and flexibility. In the midst of this, we archaeologists have had to navigate, find, and not least assert our role in the project.

The archaeological profession is often not a well-known part of an ongoing building project. It is more common that the archaeological work is conducted beforehand. Thus, a lack understanding of our methods and requirements is evident when archaeologists work with and alongside construction builders. Also, while the archaeologists have been a stable and constant feature on the West Link construction sites over the years, the build-

ing companies and their personnel often vary and change. Therefore, routines and lines of communication must repeatedly be re-established, taking time and focus away from the actual archaeological work assigned to us.

With the archaeological fieldwork now having continued for almost a decade, and with yet another six months or more to go, it is safe to say that the archaeologists involved in the project have shown extraordinary stamina. Hopefully, the experiences gained will be of use in future projects. At least two very important lessons have been learned; it is vital that the archaeological work is included in the planning of the project at an early stage, and that the communication between all parties is frequent and well-functioning (fig. 10).

Notes

1 A faussebraye is a defensive wall located outside the main walls. It is lower than the main fortification walls and is preceded by a ditch.

Archaeology on the shoreline – The Varberg tunnel project

By Elisabet Schager and Johan Klange

Between 2019 and 2022, an archaeological excavation was carried out in collaboration with Arkeologerna, National Historical Museums, and Kulturmiljö Halland, part of Halland Museum of Cultural History. Our excavation is part of a large infrastructure project called Varbergstunneln (The Varberg tunnel), conducted by the Swedish Transport Administration. The project consists of a tunnel under the town of Varberg, new train tracks, and the entire area around the train station, which is going to be transformed. The excavation area was more than 700 meters long and stretched along what used to be Varberg's coastal zone and seabed (fig. 1).

The late 1800s in Varberg - When the railway came to town

The first railway line opened in Varberg in 1880 and connected Varberg and the town of Borås, known for its textile industries, some 80 kilometres inland. Varberg and its coastline looked very different then. The winding coast was punctuated by several bays, many of which were likely shallow and sandy. In order to lay tracks and construct maintenance buildings, an extensive land reclamation took place, filling out the bays and coastal wetland areas. In order to accomplish this, massive amounts of soil and sand were used, often measuring 2–3 meters in thickness. Subsequently, the train tracks and the railway yard were built on the new ground.

18th century Varberg - The "pier" and the harbour

A large pier or jetty jutting out from mainland Varberg, is visible on maps from 1733. The depicted structure appears to be built of wood, a supposition which is supported by written sources. The harbour entrance had problems with sand sedimentation, so the jetty was used by smaller flat-bottomed vessels to unload goods from the ships anchored in deep water further out in the bay. According to written sources, the citizens of Varberg often complained about the poorly constructed jetty, and they were tired of it getting destroyed in storms. What we found was not the actual pier or jetty but a stone structure, which was the foundation or platform that connected the land and the jetty.

The Varberg clay pipes

The southernmost part of our excavation area lay just west of the location of Varberg's 18th-century clay pipe factory. The factory is known from historical maps and written records, but nothing was known about what types of pipes were produced there or what the maker′s stamps looked like.

In two pits, we found pipe bowls, stems, and some waste material from the production. We've finally found the Varberg clay pipe! Current analysis suggests the assemblage consists of at least nine different types of pipes (fig. 3).

In 1755, the councillor Emanuel Bagge applied to start his own pipe factory in Varberg. The right to produce clay pipes had to come with the consent of the king. These so-called 'royal privileges' were granted in 1756. Unfortunately, Bagge died before the application was granted; and, his colleague Johan Höök took over.

Two Dutch and one Swedish pipe master were employed by Höök during the 1756—1780s. The production stopped when the last pipe master died in the middle of the 1780s. The pipes were made of Dutch clay from Amsterdam, but they were made using an English method. The focus seems to have been on quantity rather than quality. According to the archival records, the production was quite substantial; maybe up to 3 million pipes were made. There was an export of tobacco clay pipes from Varberg within Sweden and abroad.

The Medieval period - The port town Getakärr

The Medieval town of Varberg was originally named Getakärr and was situated just north of the city centre of modern Varberg. The only visible remains today are the ruins of its church, dated to the middle of the 13th century.

Archaeological finds from excavations of the site of Getakärr indicate continuous habitation from at least the 12th century. It is likely that the site functioned as a harbour during this period before becoming a town in a more formal sense. The exact size of the town of Getakärr is unknown, but evaluation excavations indicate it is a small town centred around the church.

Fig. 1. Excavation area with features mentioned in the text. The green-grey area shows the land reclamation since the 1800s. Today's shoreline is about 250—300 metres further west than originally. Map adaptation: Halland Museum of Cultural History, edited by Arkeologerna.
Undersökningsområdet med objekt nämnda i texten. Det gröngrå området visar landåtervinningen som gjorts sedan 1800-talet. Dagens kustlinje ligger 250—300 meter längre västerut än den ursprungliga.

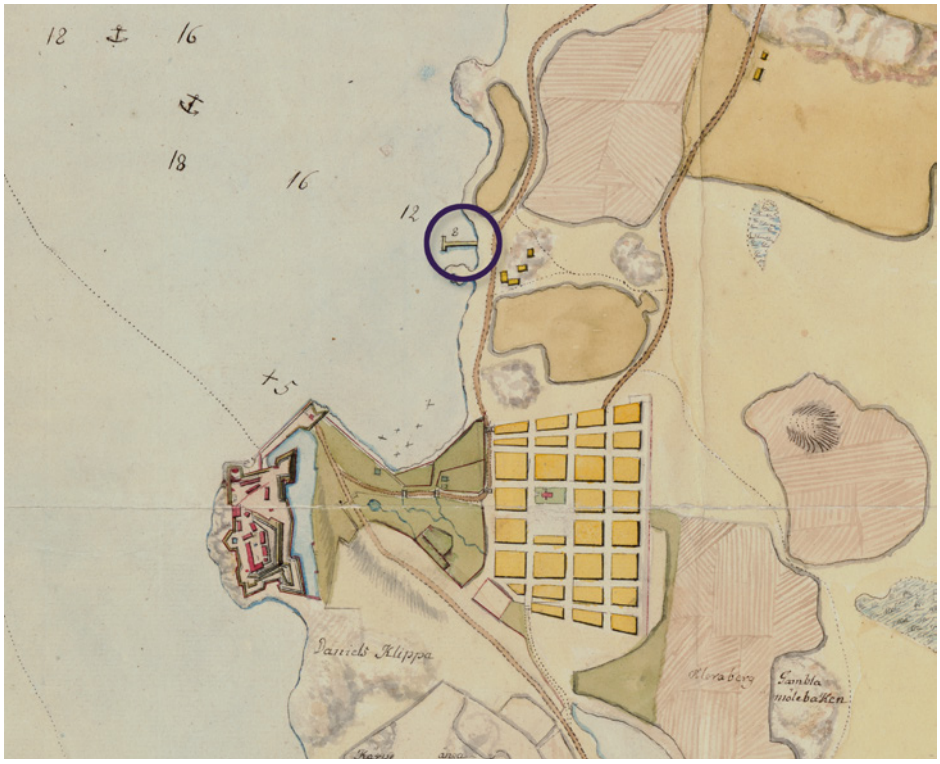

Fig. 2. Map showing Varberg fortress, Varberg town and its surroundings 1733. Circle showing the jetty or pier. Source: Sfp nr 168, The Military Archives.
Karta som visar Varbergs fästning, Varbergs stad och dess omland 1733. Cirkeln markerar bryggan eller piren.

Fig. 3. Three bowl stamps, all of them on the back of the bowl facing the smoker. Left: the most common stamp with WB (Warberg) and three royal crowns. Middle: an oval frame with a laurel wreath and letters. Right: a royal crown above a frame of a laurel wreath and the letters IH and WB. Below the bowls: production waste. Photo: Halland Cultural Museum och History.
Tre stämplar, alla på piphuvudets baksida, mot rökaren. Vänster: den vanligast förekommande stämpeln med bokstäverna WB (Warberg) och tre kronor. Mitten: en oval inramning med lagerkvistar med bokstäver inuti. Höger: en krona ovanför en krans med lagerkvistar och bokstäverna IH och WB. Nedanför piphuvudena: produktionsavfall.

Fig. 4. The larger ships are anchored in deep water in the bay outside the fortress Varberg Castle (to the left). Smaller boats are transporting the cargo to a small wooden jetty where people are waiting (to the right, marked by an arrow). Detail from Suecia Antiqua et Hodierna, Wardberg, engraving by Johannes van den Aveelen 1713. National Library of Sweden.
De större fartygen ankrade på djupare vatten i viken utanför Varbergs fästning (till vänster). Mindre båtar transporterar lasten till en liten träbrygga där människor står och väntar (till höger, markerat med pilen). Detalj från Suecia Antiqua et Hodierna, Wardberg, gravyr av Johannes van den Aveelen 1713.

Due to the large-scale changes to the coastline of Varberg in later periods, it is difficult to retrace the harbour of Getakärr. Historical maps from the first half of the 19th century do, however, show that there was a small, gently curved bay situated 140 meters to the west of the church, and it is very likely that this bay served as an anchorage connected to the medieval town. The bay was probably quite shallow and sandy, making it suitable as a beach harbour (fig. 4).

The shipwrecks

During our excavation, parts of the harbour basin of Getakärr were investigated, and six shipwrecks (W1–W6) were found, as well as evidence of coastal fishing. The excavation of the wrecks was carried out with the expert help of marine archaeologists from Visuell Arkeologi and Bohusläns Museum. Aoife Daly conducted dendrochronological analyses of the wrecks at dendro.dk. The documentation and study of the wrecks will continue in 2024, including 3D scanning of

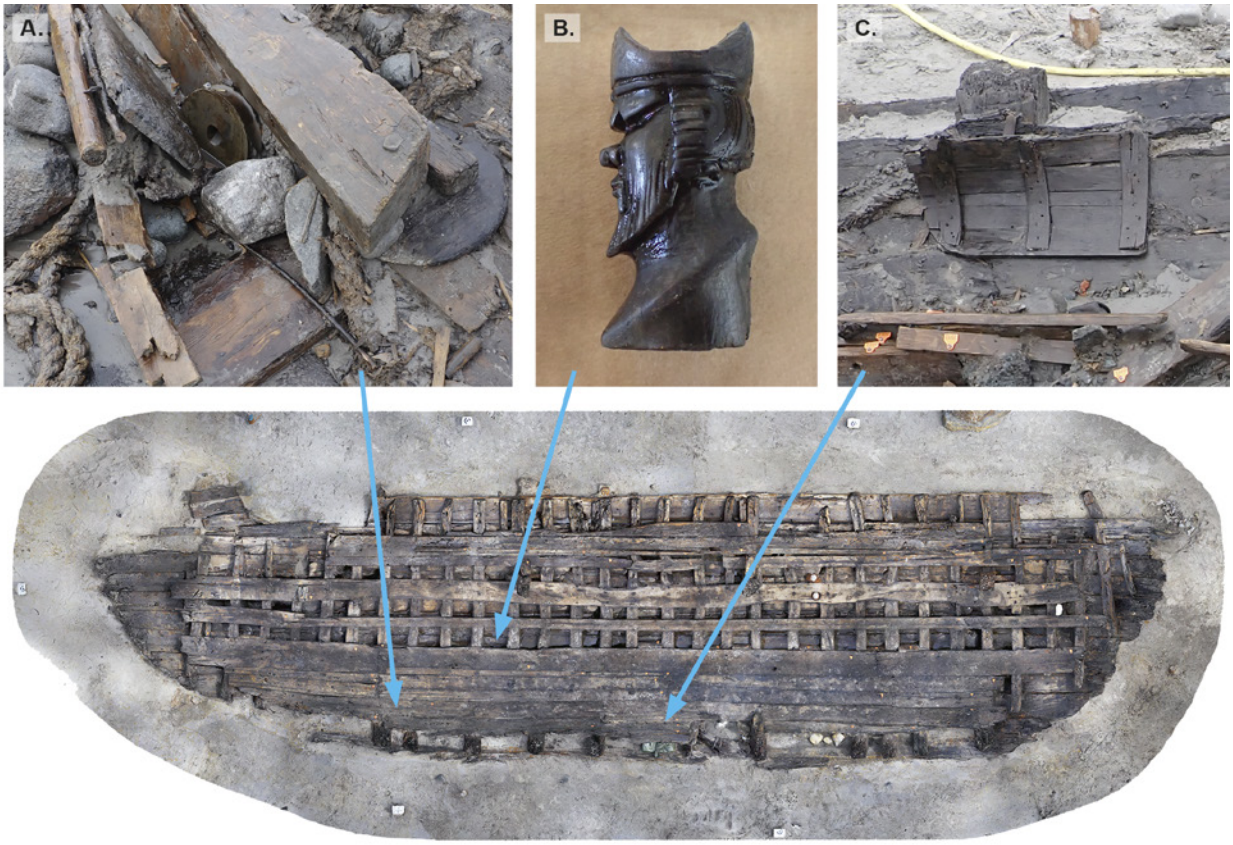

Fig. 5. Cog 1 was fully rigged when it rolled onto its port side. It consists of the nearly complete port side and is circa 20.5 metres long and 5 metres high. A. A rare cache of ship equipment and spare parts were found here under the ballast stones. B. This small item was stuck to one of the planks at the bottom of the ship. It is made of animal bone or maybe antler. Is it part of a chess piece (bishop), or is it a piece of a small handle? C. A pavise in the bottom of the ship. A pavise is a shield, often painted with a coat of arms or similar. Photo: Arkeologerna. Ortho photo: Anders Gutehall, Visuell Arkeologi.
Kogg 1 var riggad när den lade sig på sin styrbordsida. Fartygslämningen utgörs av en nästintill komplett styrbordssida, cirka 20,5 meter lång och 5 meter hög. A. Ett ovanligt fynd av reservdelar hittades här under barlaststenarna. B. Det här lilla föremålet satt fast på bordläggningen i botten av fartyget. Det är gjort av ben eller horn. Är det en schackpjäs (löpare), eller är det en del av ett litet handtag? C. En pavis låg i botten av fartyget. En pavis är en sköld, ofta bemålad med ett släktvapen eller liknande.

the ships' individual timbers, as well as various other scientific analyses.

Two of the wrecks only consisted of a few planks and a keel, and there are no dates yet. Another two, found within and further north of the excavation area, have been dated to the 15th and 16th centuries. The final two of the shipwrecks are 14th-century cogs. They were found only ten meters away from each other.

A cog was a single-masted medieval merchant vessel specifically associated with the Hanseatic League, but it was used across Northern Europe. Often seen as the successor to the Viking Age Knarr, cogs were designed to maximise cargo space. The characteristics identifiable with traditional cog construction are, for example, the bottom strakes of the vessels were built in the carvel style, while the sides are built in the more traditional clinker style. The caulking between the strakes was made of moss and secured with lathes. The decks were supported with bulky crossbeams which stuck out of the sides of the hull.

The first results of the dendrochronological analysis showed that Cog 1 (fig. 5) was built from timber felled in 1346 or just after. The oak originated from the area of Belgium, the Netherlands, and northeastern France. Cog 2 (fig. 6) was built from oak felled in northern Poland in 1356–57.

Fig. 6. Cog 2 consists of the remains of the forward end of the bottom of the hull. Roughly 8 metres in length and 4.5 metres in width. A. Leather shoe. Photo: Arkeologerna. B. Wooden spoon. Photo: Halland Museum of Cultural History. Ortho photo: Anders Gutehall, Visuell Arkeologi.
Kogg 2 utgörs av den förliga delen av bottenpartiet. Ungefär 8 meter långt och 4,5 meter brett. A. Lädersko. B. Träsked.

These two cogs highlight the importance of Getakärr as a Medieval port in the Hanseatic system. The cogs found in Europe vary in age, size, construction, and load capacity. This means that knowledge about the ship type's origin, development, and spread over time is still very limited. The cogs in Varberg will contribute with important additional knowledge.

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Starup og Haderslev… fra landsby til by

Af Tenna R. Kristensen

Igennem en årrække har der været foretaget arkæologiske undersøgelser i købstaden Haderslev og det nærliggende Starup (fig. 1 og 2). Resultaterne af de mange arkæologiske undersøgelser kombineret med skriftlige kilder, naturvidenskabelige undersøgelser og landskabsanalyser, har afsløret et udviklingsforløb med både store ligheder men også store forskelle (Englert, Hartvig & Kristensen 2016).

Der er begge steder tale om anløbspladser, hvis forudsætninger og rødder skal findes i overskuddet og rigdommen fra det frugtbare agerland langs med fjorden. Årsagen til grundlæggelsen af både Starup og Haderslev er formentlig den skibsbygnings- og søfartsfunktion, som begynder i 1000-tallets Starup og fortsætter i det tidlige Haderslev, med alt hvad det indebærer af forskelligt håndværk (fig. 3) (Englert 2016). Handel og vareudveksling har nok fundet sted, men ser ikke ud til at have indtaget nogen stor rolle i 1000- og 1100-tallet.

Bag begge pladser stod sandsynligvis personer fra samfundets øverste lag. For Starups vedkommende kunne det være en ambitiøs og velhavende stormandsslægt, som kunne garantere for pladsens sikkerhed og underhold og havde de økonomiske midler til at påbegynde byggeriet af en fornem kirke (fig. 4). Kongemagten stod formentlig bag Haderslevs grundlæggelse (Englert, Hartvig & Kristensen 2016: 195-197).

I en kort periode under 1100-tallets politiske uro har de to bebyggelser fungeret samtidigt, indtil Starup mistede sin betydning, for til sidst at forsvinde helt. Haderslev derimod blomstrede op og udviklede sig relativt hurtigt fra en mindre anløbsplads med lidt håndværk til en regulær havneby med omfattende handelsforbindelser. Anløbspladsen i Starup forsvandt sandsynligvis, fordi magtforholdene mellem stormanden og kongen ændrede sig og faldt ud til Haderslevs fordel, ligesom Haderslev lå bedre placeret i forhold til vejforbindelser og transporten over land.

Starup

Landsbyen ligger på et sandet næs på sydsiden af Haderslev fjord, blot få kilometer øst for Haderslev, og her ligger en af Sønderjyllands mest ejendommelige kirkebygninger, Sønder Starup kirke (fig. 5) (Bertelsen 2016). Den har både hvad angår placering, planløsning og byggemateriale været genstand for stor bevågenhed gennem mange år, og tolkningerne har været mange. Siden 1985 er der foretaget fem arkæologiske undersøgelser omkring kirken, i alt er et areal på 4500 m2 undersøgt (fig. 6). Undersøgelserne har vist, at der vest for kirken eksisterede en regulær bebyggelse med beboelseshuse fra 1000-tallet. Den forsvinder i løbet af 1200-tallet, samtidig med at kirken bliver mindre og fortsætter som helt almindelig sognekirke for de nærliggende landsbyer. Disse forhold kombineret med et varieret genstandsmateriale har nuanceret den tidligere tolkning af pladsen som en markedsplads af sæsonmæssig karakter (fig. 7) (Hartvig 2016).

Haderslev

Haderslev ligger i bunden af Haderslev Fjord kun få kilometer fra vest for Starup (fig. 8). I 1994 blev her udgravet et 444 m2 stort areal i flere meters dybde (fig. 9). Bevaringsforholdene var gode og en stor mængde egestolper gav gode muligheder for dendrodateringer. Ved hjælp af de mange dendrodateringer, analyser af de strategrafiske forhold og det store og varierede genstandsmateriale er det muligt at udskille syv forskellige bebyggelses- og aktivitetsfaser.

De ældste aktiviteter stammer fra første halvdel af 1100-tallet. Der er spor efter håndværkere, men kun indirekte spor efter en permanent bebyggelse i den tidligste fase. I anden halvdel af 1100-tallet inddeles området i parceller, og de første sikre spor efter øst-vest orienterede stavbyggede huse dukker op. I midten af 1200-tallet blev Møllestrømmen opdæmmet, og området tættest på strømmen blev piloteret, så det blev muligt at opføre en vandmølle. I 1409 sløjfes den ældste dæmning og en ny opføres længere mod øst. Dermed steg vandet med op til to meter, og der blev iværksat omfattende bolværksarbejder langs Møllestrømmens nordbred. Bebyggelsen er samtidig rykket lidt mod nordvest, hvor der blev fundet rester efter et

træbygget hus, opført ca. 1420 og ombygget flere gange. I løbet af 14- og 1500 årene flytter bredden atter langsomt mod syd, og i 1500-tallet blev det igen muligt at bygge i den sydlige del af området, ganske tæt på Møllestrømmen.

Håndværksaktiviteter såvel som dagliglivet kommer især til udtryk i genstandsmaterialet. Kammageren, skomageren og smeden er rigt repræsenteret, og der er et lille indslag af importerede genstande (fig.10) (Kristensen 2016).

Summary

Starup Haderslev... from village to city

Over several years, archaeological investigations have been carried out in the market town of Haderslev and the nearby village of Starup (fig. 1 and 2). The results of the many archaeological investigations, combined with written sources, natural science analyses, and landscape analyses, have revealed a course of development with great similarities and differences.

Both places are landing sites, the prerequisites and roots of which must be found in the surplus and wealth from the fertile farmland along the fjord. The reason for the founding of both Starup and Haderslev is probably the shipbuilding and seafaring function, which began in the 11th century in Starup and continued in early Haderslev, with all that this entails of different crafts (fig. 3). Trade and exchange of goods probably took place. Still, they do not seem to have played a significant role in the eleventh and twelfth12th centuries.

Behind both locations were probably noblemen from the upper classes of society. In Starup, it could be an ambitious and wealthy family of magnates who could guarantee the security and maintenance of the village and had the financial means to begin the construction of a distinguished and big church (fig. 4). The king probably initiated the foundation of Haderslev.

For a short period during the political turmoil of the twelfth century, the two settlements functioned simultaneously until Starup lost its importance and eventually disappeared completely. Haderslev, on the other hand, flourished and developed relatively quickly from a small landing site with little craftsmanship to a regular harbour town with extensive trade connections. Starup probably disappeared due to changes in the relations between the magnate and the king, which eventually fell out in favour of Haderslev, just as Haderslev was better situated transport over land.

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Fig. 1 Kort med Haderslev og Starup.
Kort: Lene Brunsgård, Museum Sønderjylland.
Map showing Haderslev and Starup.

Fig. 2 Luftfoto over Haderslev Fjord. Nederst ses Starup kirke og i bunden af fjorden ligger Haderslev.
Foto: Skrydstrup Flyvestation, 1992.
Aerial photo of Starup Church at Haderslev Fjord with Haderslev in the background.

Fig. 3 Der blev ved Møllestrømmen fundet en del skibstømmer. På billedet ses Haderslev skibet da fundet i 1954 og dateret til omkring 1220. Foto: Hans Neumann 1954.
Timber from old shipwrecks were found at Møllestrømmen. The photo shows the Haderslev ship found in 1954 and dated to around 1220.

Fig. 4 Under ombygningen af Starup kirke blev der under norddøren fundet en runesten. Den er i dag opstillet foran kirken. Stenen dateres til den ældre vikingetid og teksten lyder: "Eriks Kuml" (=minde). Foto: Tenna R. Kristensen, Museum Sønderjylland.
Runestone from the older Viking Age. It was found under the north door during the rebuilding of the church and is today placed in front of the church. The text reads: "Eriks Kuml".

Fig. 5 Starup kirke.
Foto: Thomas Bertelsen
Starup church.

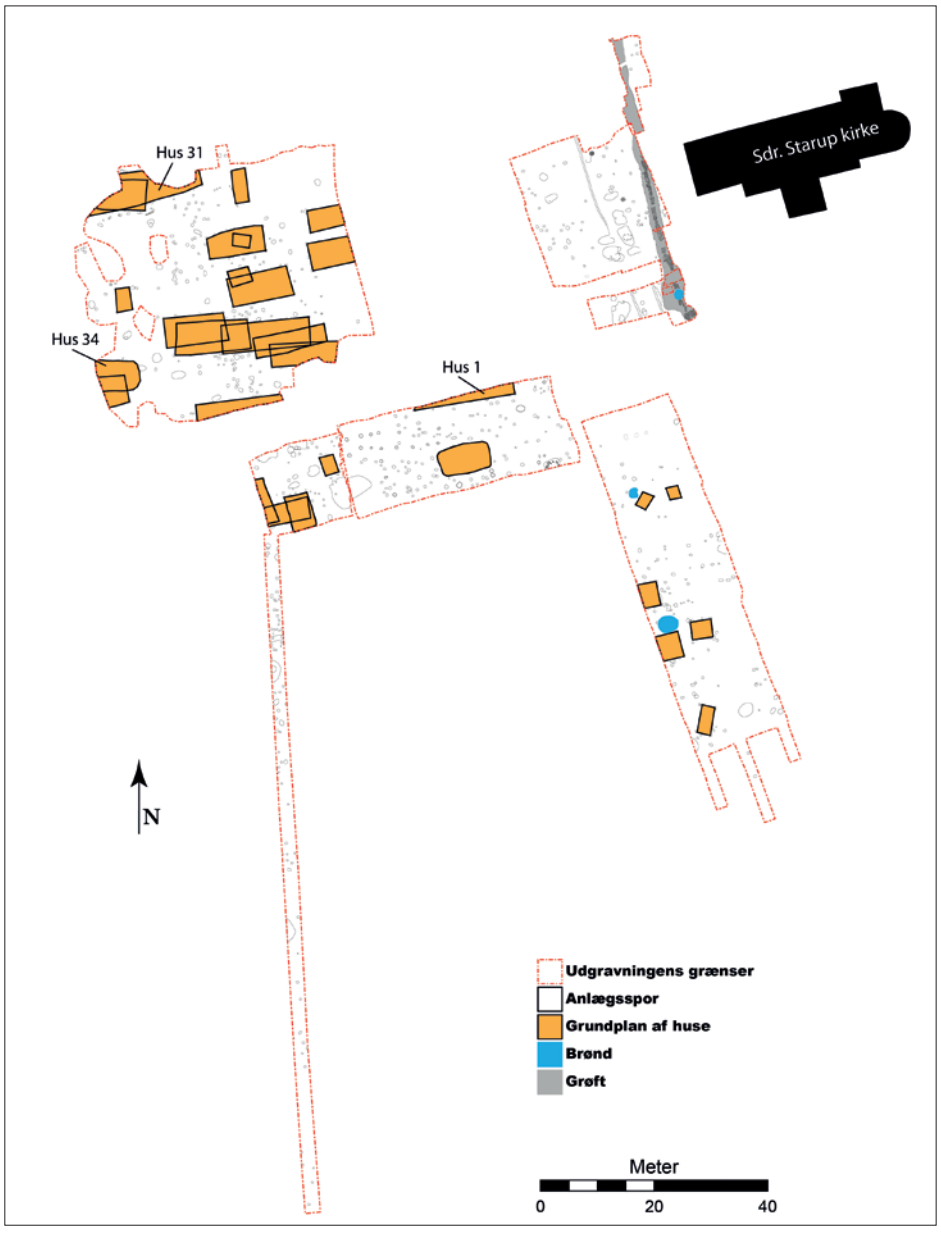

Fig. 6 Oversigtsplan over den undersøgte bebyggelse ved Starup. Tegning: Anders Hartvig, Museum Sønderjylland.
Overview plan of the excavated settlement at Starup.

Fig. 7 Fund fra Starup.
1. Klinknagler.
2. Fuglefibler i bronze.
3. Remspænde af bronze og med dyrehoved.
4. Essesten med bevaret indblæsningshul.
Fotos: Jørgen Andersen, Museum Sønderjylland & Steen Hendrichsen.
Finds from Starup.
1. Rivets.
2. Bird-shaped brooches of bronze.
3. Belt buckle of bronze with animal head.
4. Tuyère from af blacksmith's forge.

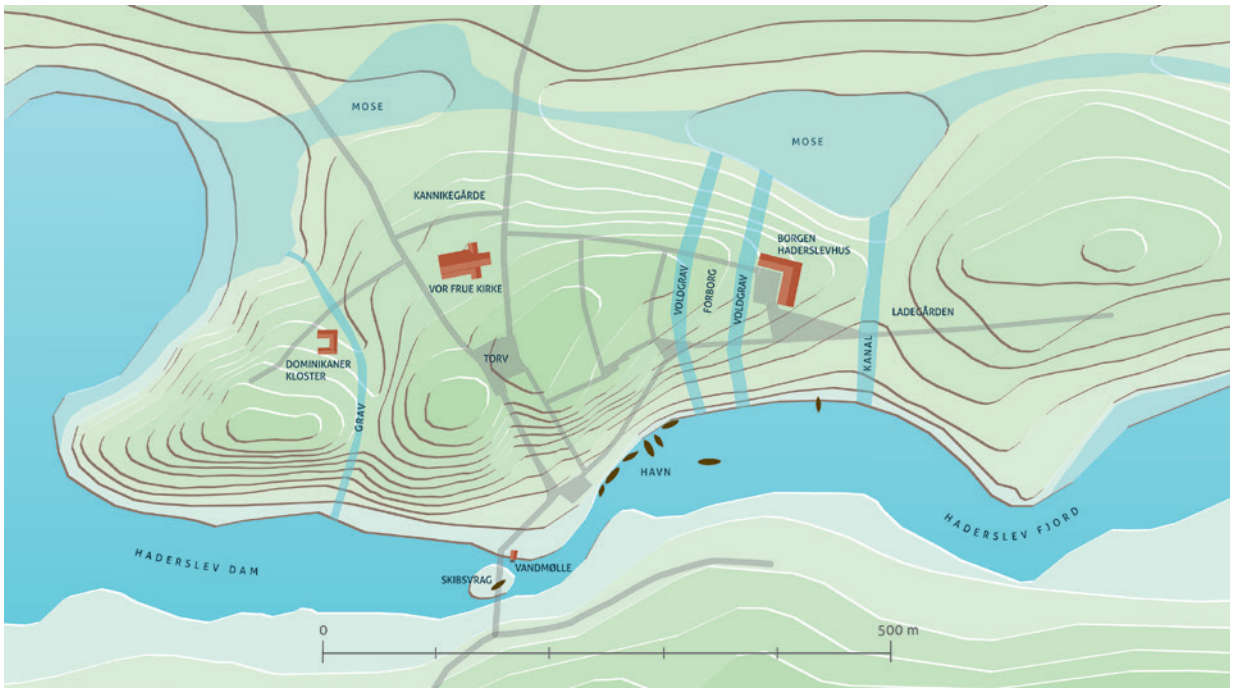

Fig. 8 Kort over de middelalderlige institutioner i Haderslev. Udgravningen var placeret ved vandmøllen.
Kort: Jørgen Andersen
Map showing the medieval instutions in Haderslev. The excavation was at the "Vandmølle" site.

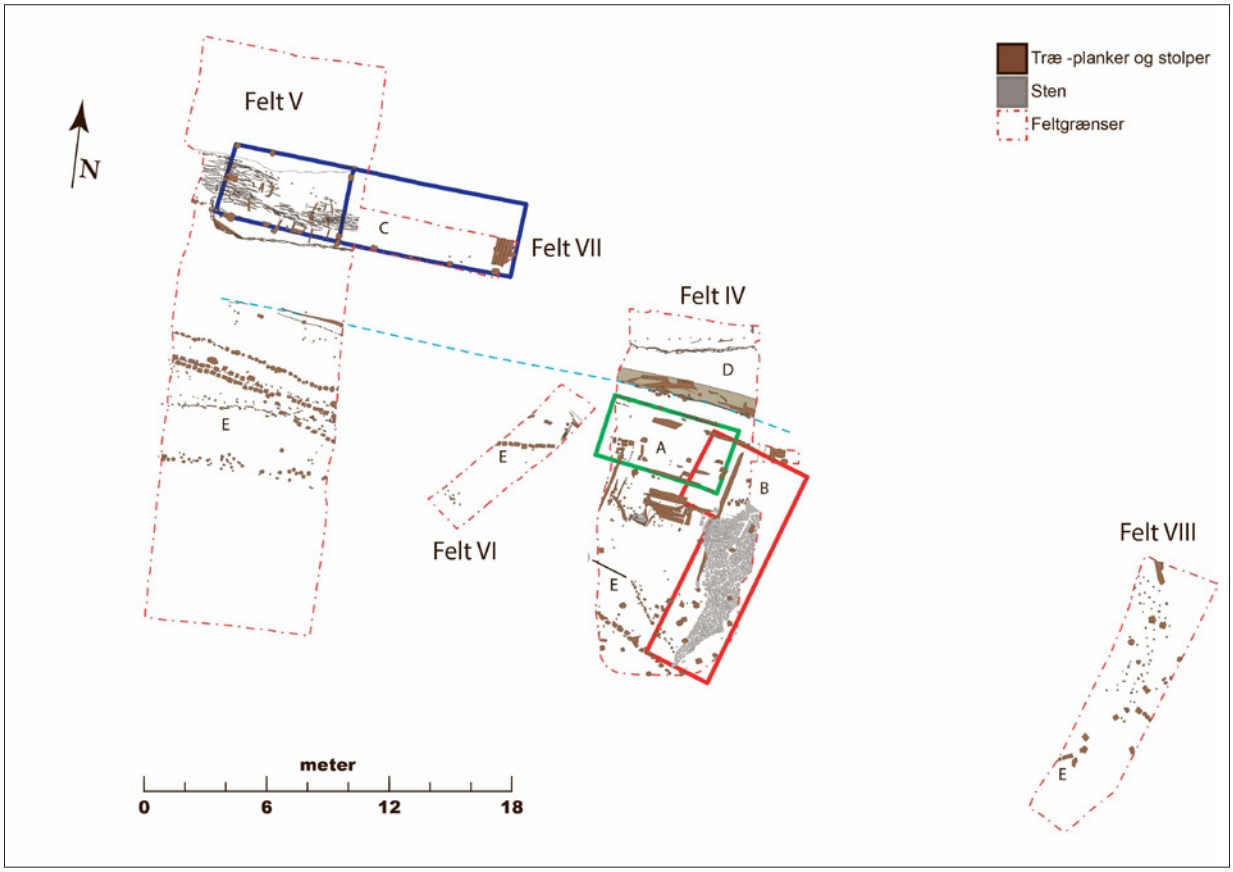

Fig. 9 Oversigts lan over det udgravede område ved Møllestrømmen i Haderslev. Tegning: Hans Peter Jørgensen, Thomas Hunniche og Tenna R. Kristensen
Overview plan of the excavated area at Møllestrømmen.

Fig. 10 Fund fra Møllestrømmen.
1. Stolpe med udskåret mandsansigt
2. Ravterning
3. Lædersko
4. Mundharpe af jern.
5. Geddeforfang af messing.
6. Benkam.
7. Hestesko af jern.
8. Stigbøjle af jern.
9. Træske.
Foto: Steen Hendrichsen.
Finds from Møllestrømmen.
1. Wooden post with a carved man's face.
2. Amber dice.
3. Leather shoes.
4. Jaws harp made from iron.
5. Pike hook made of brass.
6. Bone comb.
7. Horseshoe of iron.
8. Iron stirrup.
9. Wooden spoon.


VÆRGEN