Section II – Exploring the archaeology of Rådhuspladsen

The emerging medieval town of Copenhagen – some ideas about 'where, how and why'

Introduction

The question of how Copenhagen came to be is an old one, resulting in numerous and sometimes conflicting theories from historians and later on, archaeologists, since the 19th century. However, the source material has been scarce, both from a historic and an archaeological point of view. A dearth of large excavations in the old parts of the city has kept the archaeological evidence fragmentary, a corollary of which is a lack of synthesis pertaining to the more recent archaeological evidence.

In connection with the Metro Cityring excavations the Museum of Copenhagen has had the opportunity to conduct major excavations in areas pertinent to the development of the medieval town. The sites of Kongens Nytorv (*The King's New Square*; 2010-) and Rådhuspladsen (*The Town Hall Square*; 2011-2012) lie on the borders of the high and late medieval town, but are traditionally seen as being located outside the earliest settlement. The preliminary results of these excavations, particularly Rådhuspladsen, together with those from the 2008 excavation of St. Clemens cemetery and a number of indications and results from small watching briefs around the city, allow us to update the story of the early development of Copenhagen.

Figure 113 Copenhagen and the Øresund area, with important towns marked.

The findings at Rådhuspladsen indicate that the city's early development is a complex process with more phases and involving more agents than hitherto asserted. At present, there is insufficient empirical data to fully investigate this. However, the results obtained provide some interesting insights, albeit in a

preliminary form. Questions which can be put to the material are: *What kind of place was early medieval Copenhagen? When and how did the town start to develop? Why did it develop as it did? And who were the people who settled here and lived their lives in the new town?*

The potential that this new information holds for enhancing our knowledge of Copenhagen's role in the Øresund (Sound) area in the dynamic period of the Early Middle Ages is invaluable. Moreover, it can further our understanding of the general historical development in the eastern part of Denmark in this period (ca. 1050-1200).

Urbanisation and urbanity

The process which leads to the development of a place into a town (urbanisation) can be complex and differ from case to case, just as the functions of the specific town can vary. A common trait is that the town constitutes a centre of authority and organisation. The settlement is usually characterised as being dense and organised in plots. The location of the town is perhaps foremost based on its communication possibilities. That is why the town has to be considered in its wider context, as an actor in the landscape and the region, interacting with its surrounding villages and countryside. A number of non-agrarian functions are placed in the specific location (the town), which has implications for the type of life and living conditions present in such a place (urbanity). Trade and craft are perhaps the most important of these non-agrarian functions. The town is a place where people from different places and with different roles meet and create a type of life which in many ways is different from in the countryside.

Previous research on Copenhagen's early period

Traditionally, the founding of the town is said to have occurred in 1167, when according to Saxo Grammaticus, the Archbishop Absalon is said to have built a new castle on the island of Strandholmen. Another contemporary written source is the letter Absalon received from Pope Urban in 1186, stating that King Valdemar I had given him the castle in Havn (the early name for København/Copenhagen) and what is interpreted as an estate or village of Havn. The meaning of the passages have been scrutinised by historians over the years, but there is little consensus on what Absalon was actually responsible for building, and what type of place Havn was at this time. The dating as well as the placement and function of the earliest settlement has also been subject to much debate. The general agreement though, among both historians and archaeologists, is that Copenhagen/Havn has a history predating Absalon. What kind of a place Havn was at this time, as well as the dating and placement of the earliest settlement/town, cannot however be said with certainty to have been agreed upon. The primary reason for this being the meagre archaeological source material.

The most established theory among scholars until recently, has been that Havn was a seasonal market place, with fish as a main trading commodity, and that its importance grew during the 12th century. The first settlement has been believed to have been located within a moat and rampart in a 2.5 ha area, with the church of St. Clements placed outside. Even with regard to these theories however, very much has been uncertain: the date of the permanent settlement, the types of activities, the function of the moat and rampart, existence of an eastern settlement, and the dating of the earliest church in the town, for example.

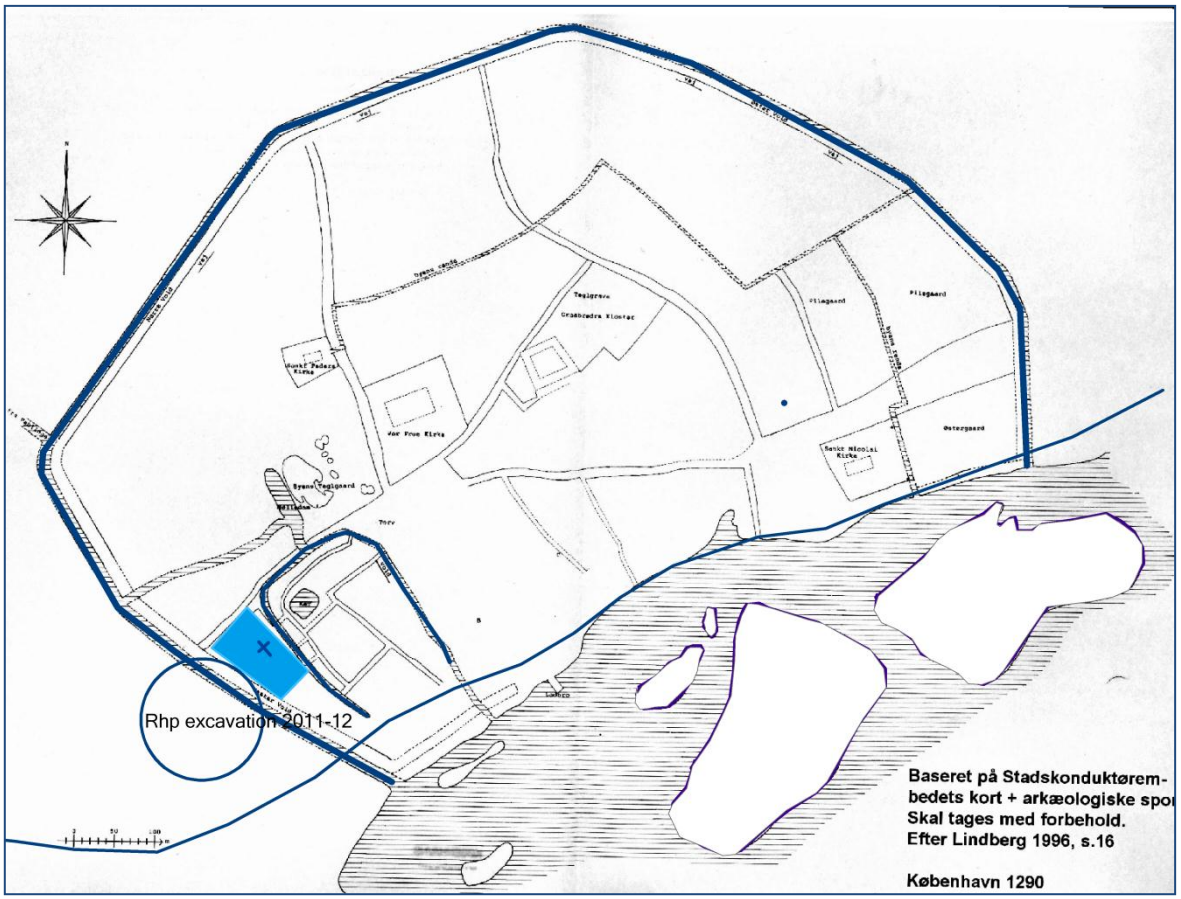

Figure 114 Small horseshoe-shaped enclosure and St. Clemens church and cemetery on the background of the high/late medieval town. The approximate location of the Rådhuspladsen excavation is marked with a circle.

New additions to the archaeological record

In the past 25 years, and particularly in the last 10 years, excavations and watching briefs around the city centre have piece by piece updated and added to the archaeological record, providing new indications on the dating and topography of the early settlement. There are, however, reservations as to the extent to which these highly limited and scarce remains can be considered as clear evidence. It is often only an isolated radiocarbon date or a few finds that constitute the grounds for dating. It is also uncertain, in some cases, as to what the archaeological source material from these excavations represents, i.e. if deposits should be seen as remains from activities at the precise location, or if the material has been transported from other places in the vicinity, to be used as infill.

With these caveats, the following map (Figure 115) and list show some of the most important locations where there are indications as well as more firm evidence of early medieval activity, from east to west:

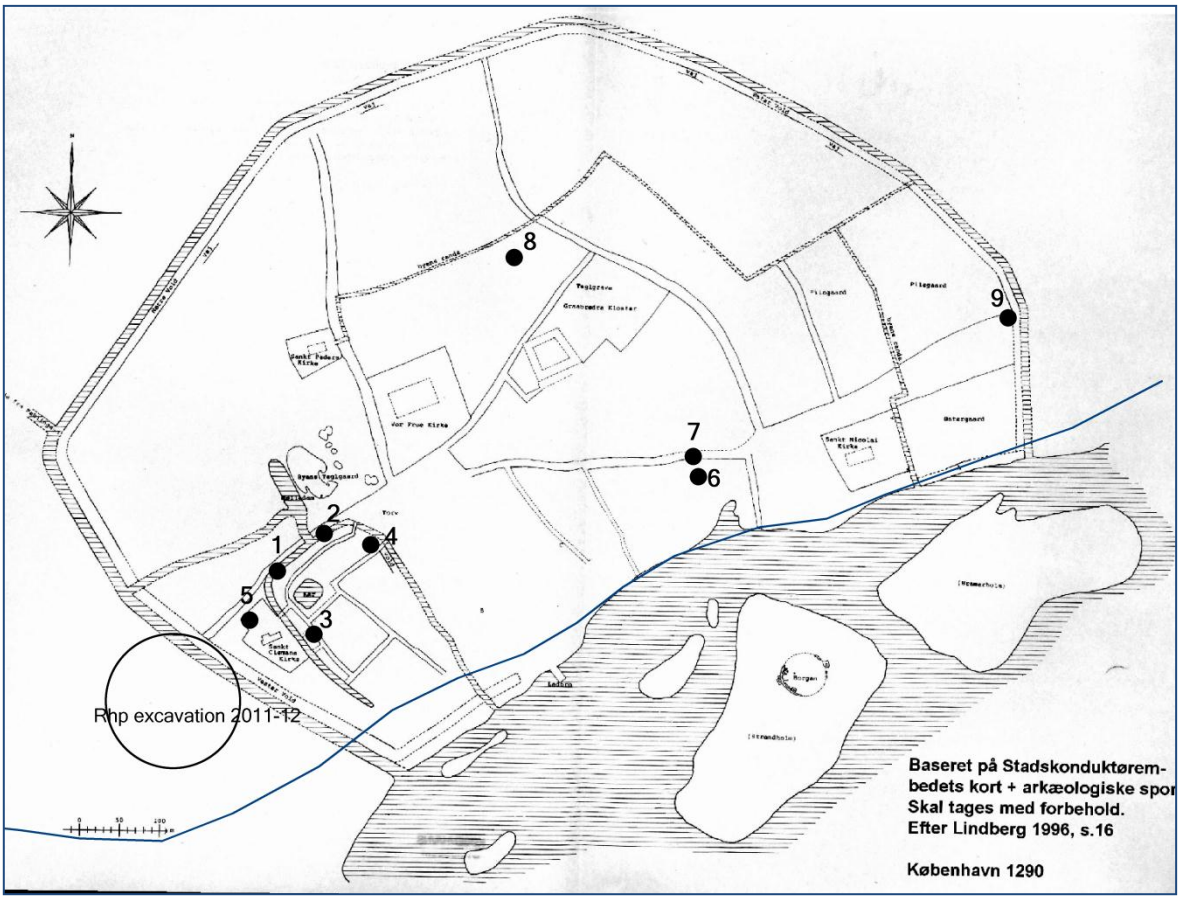

Figure 115 The medieval town. Shown here are some of the archaeological finds which have enabled archaeologists and historians to rethink the dating and the extent of the early town. The map also marks the placement of the 2011-12 excavation at Rådhuspladsen (circle). 1. Fredriksberggade, Vester Voldgade, Mikkel Bryggers Gade; 2. Vestergade 7, 1989; 3. Mikkel Bryggers Gade 11-13, 1989; 4. Gammeltorv 18, 2008; 5. Vestergade 29-31, 2008; 6. Amager Torv/Højbro Plads, 1994; 7. Amager Torv/Læderstræde 8, 2003; 8. Regensen, 2012; 9. Kongens Nytorv, 1999.

The excavation at Rådhuspladsen

Although the archaeological evidence listed above attests that the extent of the early settlement appears to be different from what was previously believed, the excavation at Rådhuspladsen has given this a new perspective or dimension. Due to the location of the site outside the medieval town, it was thought to offer little potential for finding evidence of early medieval inhabitation. Contrary to this however, a good deal of early medieval material was indeed encountered, indicating that the extent of the early medieval town goes beyond the town's later medieval borders towards the west. Yet perhaps more importantly, the excavation has produced empirical source material of such a scale that we now, with a new degree of certainty, have important information indicating the kind of place early medieval Copenhagen was.

The excavation comprised of 1750 m^2 which was subject to excavation, and 2600 m^2 of watching briefs (see Figure 4). Due to intensive use of the area from the high medieval period and onwards (for instance construction of multiple phases of moats and World War 2 air-raid shelters) a large part of the area was badly truncated, potentially removing early medieval cultural layers. Thus, most traces of activities from

this period that remained were deep cuts and their fills. Therefore, we know very little of the ground level from that time, and the information we have about activities in the area is fragmentary.

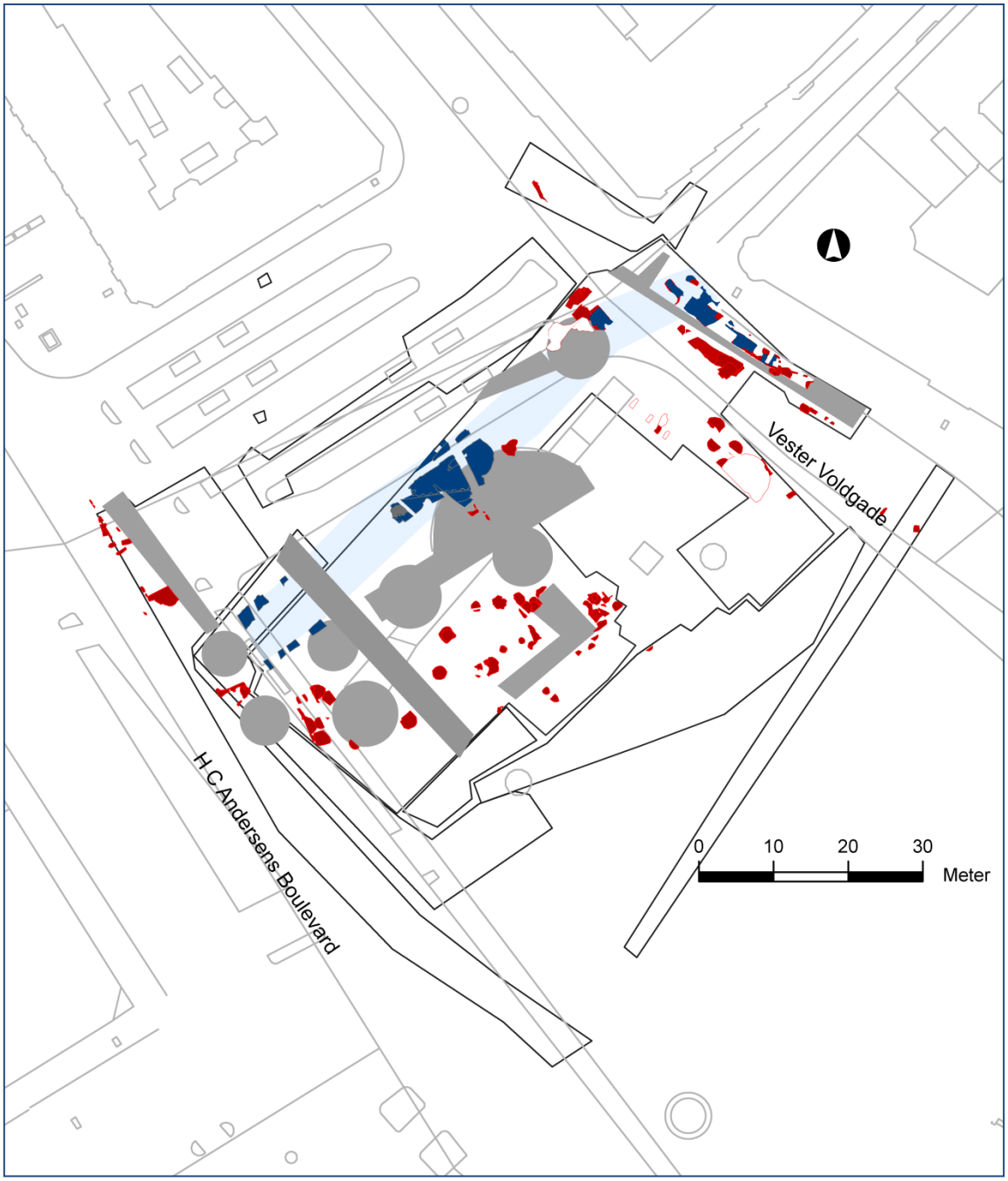

Figure 116 Plan of the excavation with finds from c. 1050-1250 highlighted in red and blue. The main truncations are marked with grey. The circular, smaller, oblong features represent the WW2 air raid shelters. The excavation trench is the large, central, rectangular figure where the modern toilet building makes up the missing piece. The watching brief trenches surround the excavation trench. It should be noted that, most of them had been dug up before, and contained, to a large extent, disturbed soil.

The features in question were spread across the excavation area (see Figure 116). They consisted of pits, wells, simple buildings, roads and graves. From finds and stratigraphic relationships, we can date these features in a broad fashion to the late 11th-13th centuries. From sometime in the 14th century, it is evident that most of the area has been used for other purposes. In the eastern part of the excavation area, the high medieval fortification with its moat, rampart and city gate "Vesterport" (Western Gate) were constructed, leaving huge cuts in the early medieval ground. No activity similar to the early medieval use of the area has been identified from the late 14th century onwards outside what is known as the town's high and late medieval borders.

Early medieval production and settlement area

A large part of the area contained pits and well-like features that were preliminarily dated to the early medieval period through pottery and comb types found in their fills. The pits are believed to have been used for storage in connection with dwellings or productions – some might also have been used for specific purposes related to the iron production on the location (see below). There were c. 60 cuts interpreted as pits and 12 as wells, all but one located south of a potentially contemporary road running in a southwest-northeast direction across the excavation area. The road was preserved in several phases of usage, dated by 14C-analyses from the early to the late medieval period. It is likely it was used until the outer western gate was built in the 16th century.

The pits and wells were situated quite close together, and contained similar fills. Some were subject to inter-cutting, which would suggest several phases of activity. Seen in plan view, it appears as though they were placed in a system, almost in rows at a certain distance from the road (Figure 117a). This could suggest the idea of a pattern – for instance that they could be placed behind hypothetical houses that might have been located between the road and the pit/well area. This was one way of arranging household activities in medieval towns, with houses for dwelling and/or booths for trading closest to the road, and other activities, including places for refuse disposal, placed behind them. There is also evidence, for instance from Lund in the 12th century, that in this period with less regulated craft activities, workshops were placed far back on the plots. However, no plot borders have been recorded at Rådhuspladsen. Furthermore, since the area which hypothetically would have contained houses was, to a very large extent, truncated by later activity, we do not have any archaeological data from that area – the apparent pattern of pits and wells could merely be imagined. The categories of features uncovered suggest, on the one hand, that the area was mostly utilised for production and craft, and as such it would perhaps be of a less regulated character. On the other hand, due to the large truncations, dwellings and regulated plots borders leaving more shallow cuts in the ground than pits and wells, would hardly have survived. The best evidence of the activities taking place her could be argued to be the backfills of the pits. The find material in the deposits of the pits contained both refuse from craft and production as well as household refuse. This strongly suggests that the area may have been used as a combined dwelling and craft area.

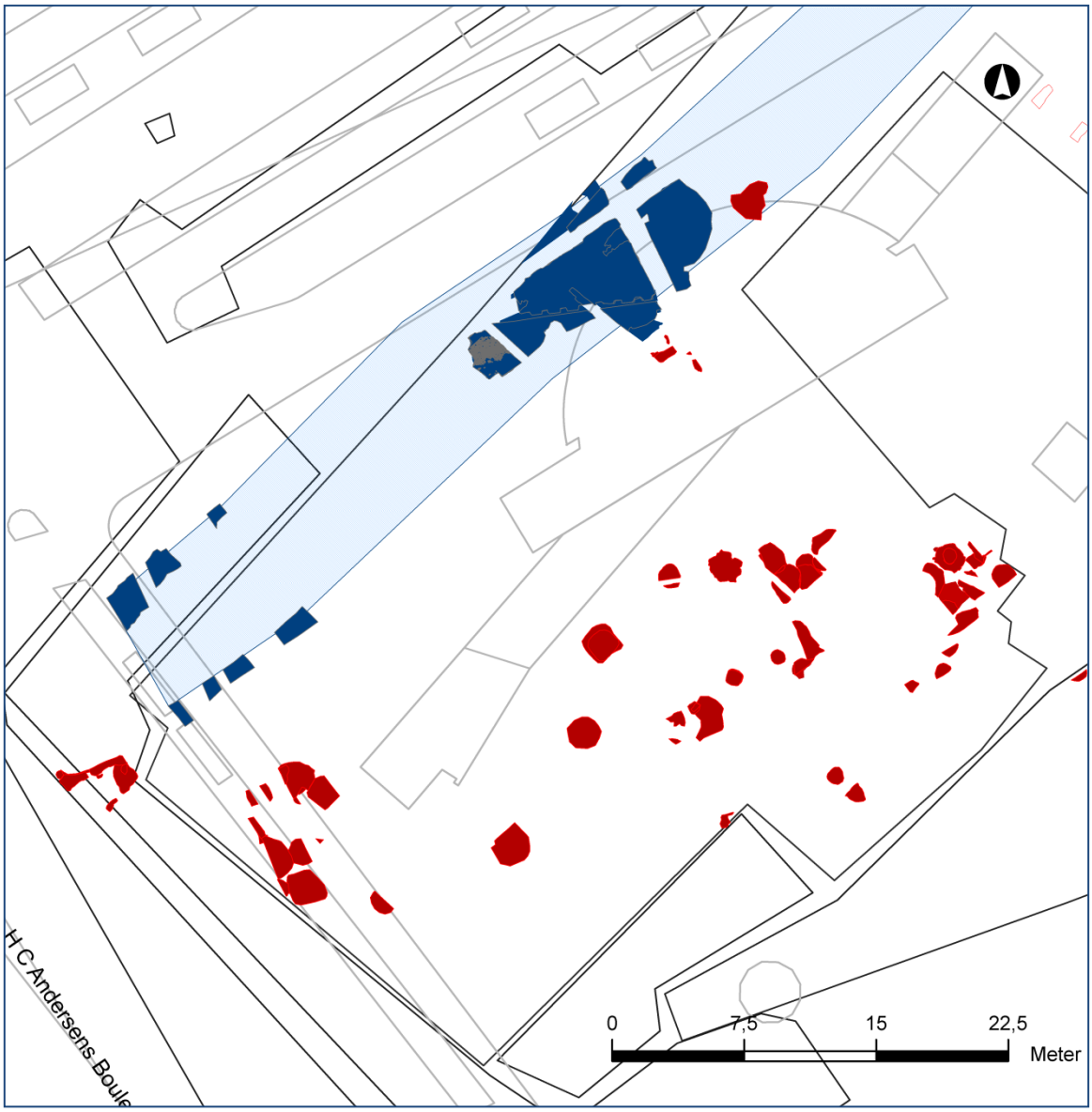

Figure 117a Close-up of area with pits and wells in the middle of the square. The reconstructed road is marked with light blue, the preserved road parts in dark blue

Figure 117b Pit from 12th century, pre-excavation. Photo: Museum of Copenhagen

The features interpreted as pits were generally of a size of 1-1,5 meters in diameter and up to 1,5 meter deep. The pits and wells had been utilised as refuse pits after the primary use had stopped. It is also possible that some pits were dug as refuse pits originally. Many of the backfills contained craft-related refuse, with iron slag as a significant component. Many backfills also contained a substantial amount of fish bone and other bones. Other important find categories were pottery, daub, iron objects such as different tools and building material. Personal items like bone combs and bone pearls were also found in the deposits (Figure 118a and b). The pottery was mainly Baltic Ware (1000-1250) or Early Redware (1150-1400), which previously has been scarce in Copenhagen. One pit contained a single Viking Age potsherd. Collectively, the backfills can be described as containing both craft-related and household material.

The wells were between c. 0.6 m and 2 m in diameter, up to two meters deep and typically with vertical sides and flat bases. In some of these features, the fills did not seem to be highly affected by water, and only one had an obvious lining in the form of a timber well lining. Alternative interpretations for some of these features could be some type of container – for instance a water cistern or a silo. Cisterns or silos were often placed in connection to dwellings or to other activities requiring the use of water or other storage, e.g. of grains. Pollen analysis from one of the more typical wells suggests a usage in connection with tanning or brewing.

The general interpretation of the pits as primarily used for storage, and secondly for refuse disposal, signifies they were related to dwellings, even though we do not have extensive evidence of such structures. Pits were generally used as storage for food supplies, and they could be placed either outside the houses or under the floor indoors. The pits and wells could also have been useful for storage or specific activities related to different types of craft or production, for instance to keep raw material in a controlled atmosphere, and of course for water which was needed for many purposes. Furthermore, if the backfills of

the pits and wells were to be seen as traces of the activities taking place on the location, it is likely that they have been part of craft- or production activities. The evidence indicates that the site has been the location of iron working and possibly also of fish handling and other crafts, such as comb making, as well as the place for occupation.

As mentioned above, the pits and wells were situated south of the road running east-west. However, except for the burial area described below, almost no area to the north was available for the preservation of early medieval remains. Moreover, there were no borders or endings of the activities observed to the east, west or south in the excavation area. To the east, we know that St. Clemens Church and cemetery were situated, but we do not know how far towards the west or the south the activities occurred. The coastline at the time should have been found a couple of hundred meters to the south/southwest (see fig. 114).

Figure 118a and b Part of a comb and sherds of Baltic Ware found in pit backfills at Rådhuspladsen. Photos: Museum of Copenhagen

The datings of these features rely on a combination of typology of artefacts, stratigraphy and radiocarbon dating of seeds from primary pit fills and road layers. Preliminary ^{14}C-datings from primary fills of pits show a time span from the late 11th century to the early 14th century. The oldest pits are dated to 1070+-55 and thereabouts. The Baltic Ware pottery found in the backfills date preliminarily to the 12th century (Figure 118b), while some later dated pits also had Early Redware and Late Greyware in their backfills. There are several combs of late Viking/ early medieval types (Figure 118a). This gives an initial usage period of this area to the late 11th to mid-14th century, with the period c. 1100-1250 as the busiest phase.

Figure 119 Archaeologists from the Museum of Copenhagen excavating early medieval features in Vester Voldgade in 2011. Photo: Museum of Copenhagen

In the eastern sector of the excavation area, closest to the central part of the town, some scattered traces of buildings were found together with pits as those described above. This area was less disturbed by later activities, possibly because the rampart of the later medieval fortification may have built on top of it. Thus, some cultural layers and original topsoil were preserved. The traces of buildings were fragmentary and consisted mainly of a few postholes, beam slots and fragments of clay floors. Since the undisturbed area was quite small, no complete buildings were identified. Analyses show, that at least four phases of usage of the area within the time period c. 1050-1300 can be discerned. This means, that the building structure and usage pattern in the area area was completely or partly re-organised three times during this time. With regard to the discussion of the kind of activities the western area described above represent, it could be argued that the better preservation conditions seen in the eastern part of the area, give an idea of how the whole of the area has been used – for dwellings and production in several phases. In this area, the Vesterport town gate was later built. Below the gate's foundation, was a stone paved layer found, interpreted as part of an earlier road. A calibrated ^{14}C-dating from a seed found in between the stones dates to 1069+-52 (Calendric Age).

Burials

Perhaps the biggest surprise of the excavation at Rådhuspladsen was the discovery of early medieval graves in the north-western corner of the square. The first results of these point to a dating range of these graves to within the timespan of 1040-1126 (Calendric Age, cal AD).

The remains of all individuals were analysed with regard to age, sex, height and basic pathology. The analysis showed that the buried individuals consisted of women, men and children of all ages, suggesting this to have been a typical part of a settlement population. Nothing specific in terms of health or disease could be seen. The only information of particular note was the unusually tall height of the two individuals where estimations could be made – a man of 179 cm, and a woman of 170 cm. No conclusions can of course be drawn from two individuals, but the indication is nevertheless curious in light of the fact that the individuals buried nearby in St. Clemens cemetery at about the same time were exceptionally small. Several women from the early phase of the St. Clemens cemetery (approximately dated to 11th-12th centuries) were of a height of between 140 and 145 cm, and some individuals categorised as probably male were 162-165 cm tall. The average height of women during the Middle Ages was 160-162 cm, and for men 173 cm. During the Viking Age, the average heights were somewhat lower, for women 158 cm (Bennike and Brade 1999, p. 16). The individuals from St. Clemens cemetery and those from Rådhuspladsen are placed outside either side of this scale, although believed to be contemporary. The possible significance of this is worthy of investigation. Further analyses hopefully can provide information about diet, living environment and place of origin.

The layout of graves and the demographical indications can point to the burials belonging to a parish cemetery, most likely connected to a church or chapel. However, there is no information from written sources to suggest that a church was located here. In the historical records, there is no reference to more than one church during the early medieval period. The one church mentioned is interpreted as being the church of St. Clemens. From what we now know from the archaeological record, a new study of the references of the historical sources to churches during the medieval period would be beneficial.

The density of burials, which becomes higher towards the north, indicates that the centre of the cemetery is located in this direction, as well as the probable church. There are other indications of the full extent and placement of the cemetery. Ca. 25 m to the east, a pair of human shinbones was found at an earlier stage of the excavation, in a very small watching brief trench, which at that point was seen as a stray find. Additionally, according to a note from 1954 in the museum's archive, skeletons were found outside the building which faces the north side of Rådhuspladsen, quite close to the graves found in 2011. At that time, the question was if the skeletons should be considered as deriving from a modern murder or if they were historical. After we checked with the Police archive, it was evident that the skeletons were not modern. Knowing this, it is likely that they may be a part of the newly discovered early medieval cemetery.

The stratigraphic conditions as well as the ^{14}C -results indicate that the usage period of the cemetery was fairly limited, but still more than a temporary feature. However, since the cemetery, and its hypothetical church, is not known from written sources, it is likely that it was taken out of use quite early in the medieval period. This is confirmed by the dates of the graves. It is tempting to see the cemetery, the occupation and production activities as a contemporary phase of activity which at one point came to an end and in its place the high medieval fortification was built running through this area. What this could mean will be discussed later in the text.

To sum up, the excavation at Rådhuspladsen has yielded crucial new information on the early history of Copenhagen. The information can be interpreted in the following way:

- Part of the settlement or town has been located further to the west than previously suggested, which could have several implications. It could mean a larger extent of the earliest town, or perhaps that the town's centre was located further to the west than previously believed – or that there were several settlement nuclei at this point.
- The findings seriously question the former theories about the horseshoe- shaped ditch and rampart east of St. Clemens and west of Gammeltorv as marking the earliest extent of the town.
- It is likely that there has been a previously unknown church in the west – which was abandoned, possibly already in the late 12th century. The presence of two churches points to social complexity, and the later abandonment of the cemetery and activity area suggest a change of organisation or power relations in the town.
- There is evidence of craft production – primarily iron working. Also significant is the occurrence of fish bone – which could be seen in relation to trade.

The early settlement - or town - What type of place was it? What do the results imply about the early urbanisation of Copenhagen?

What does this new archaeological data, both from Rådhuspladsen as well as the earlier indications from around the town centre, suggest of *the type of place* Copenhagen or *Havn* was in the 11th and 12th centuries? Long-standing questions, such as when the oldest settlement can be *dated* to, where it was *situated*, *who* initiated the new settlement, and *why*, can now have new light shed upon them. This new information also enables us to ask questions about the people who moved to the town – about who they were, and why they settled down here. This will not be discussed in any depth, here, but left for future enquiry.

Dating, topography

Previously, it was assumed that the settlement developed possibly from the late 11th century and onwards, but now we have more firm indications to suggest that Copenhagen could already have been a place with a developing urban character in the late 11th century. The dates from St. Clemens cemetery, the ditch surrounding the horseshoe-shaped enclosure, dates from Mikkel Bryggers Gade and Vestergade as well as the ditch at Kongens Nytorv, all indicate substantial human activity already during this period, and over quite a large area. The ^{14}C-dates of the burials from Rådhuspladsen are among the earliest dates we have of activity in Copenhagen, and they point to a well-established cemetery, alongside with the cemetery of St. Clemens, going into the 12th century. Moreover, quite a large amount of 14C-dates from the production and settlement activities, starting from the late 11th century add to the picture of Copenhagen as a busy place when the 11th century turned into the 12th.

The general picture of the topography of early Copenhagen may be interpreted in several ways. It may indicate that the early medieval settlement was placed along the beach in the rough shape of a long-stretched oblong shape (Figure 120). Parallel to the coast, and later harbour, was a road running west-east, entering the location between the grave area and the production area at Rådhuspladsen (and documented

at the Rådhuspladsen excavation), and ending at Kongens Nytorv. Along this road, the town developed. Alternatively, there could originally have been two or more nuclei, as nobleman's estates, each with its own church, cemetery and farm houses. These types of settlements from the late Viking Age and Early Medieval period have been brought to notice in recent Scandinavian research. These places often had different functions, some with specialised craft activities. The town would then have developed and grown from this two centers.

Toward a new "map" of early medieval Copenhagen – a hypothesis

With the archaeological data outlined above, together with the theories presented, a new map can be suggested for how the town might have looked in the early medieval period (Figure 120). The physical map has significance for the "map of power" in the town, which will also be discussed later.

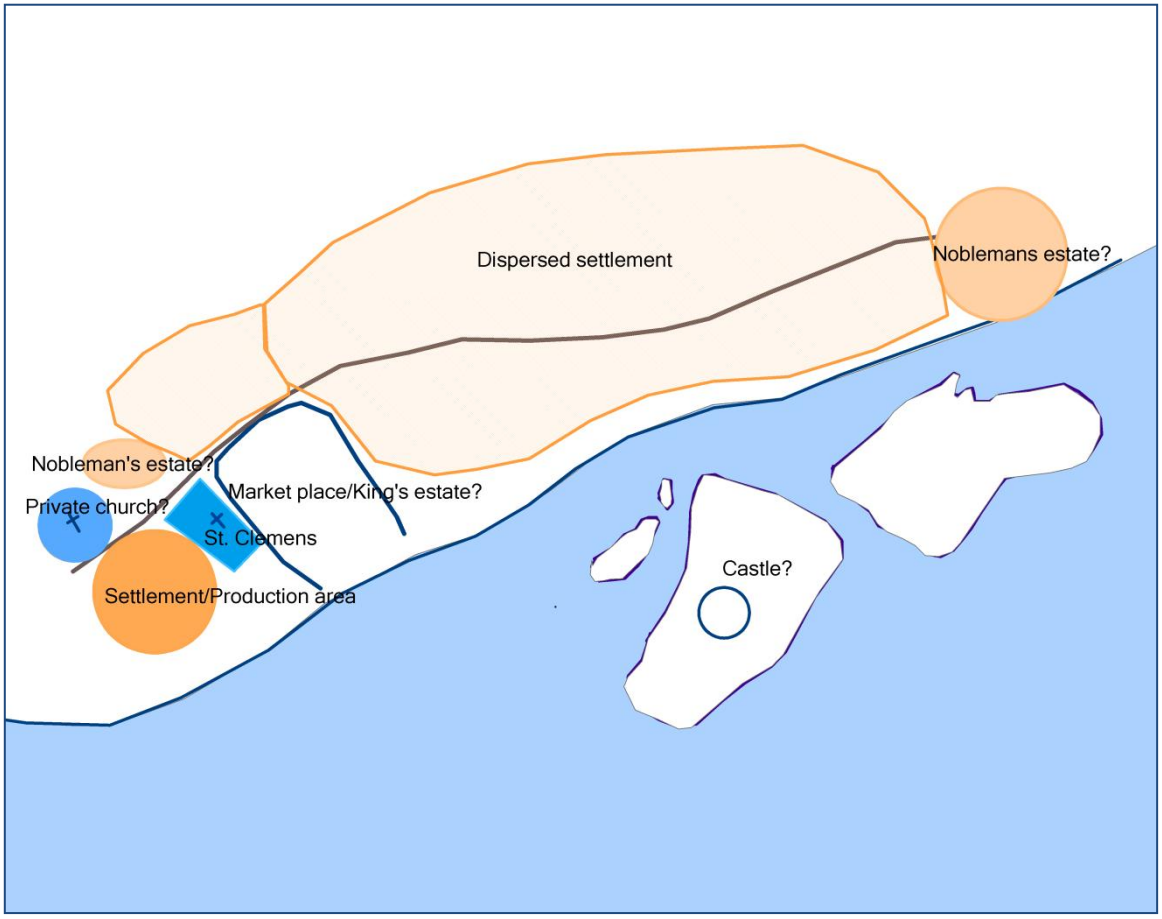

Figure 120 Map with suggested placement of various activities.

The horseshoe-shaped rampart and moat, which earlier was believed to be the first fortification and extent of the town could instead have been a protected market place, or possibly a fortified/enclosed king's or nobleman's estate. Immediately to the west, the church of St. Clemens could have been built already in the 11th century, or early 12th at the latest. West of the church (at present-day Rådhuspladsen) there seems to have been a combined production/dwelling area. North of these activity areas, a road ran in an east-west direction. North of the road by the production/dwelling area, a second cemetery was placed. The hypothetical church connected to the cemetery probably lay further to the north, since the grave density increased in this direction. Assuming this would probably have been a private church, there could have

been a nobleman's estate next to it – this is suggested solely according to frequently used archaeological theories - no archaeological evidence of this is presently at hand. In the area east of the horseshoe-shaped enclosure, from Gammeltorv all the way to Kongens Nytorv, the archaeological evidence attests that there before the 13th century probably were sparse settlement activity here, much like farms, which was a common layout of the early medieval town settlement, e.g. in Lund. Finally, at present-day Kongens Nytorv, more solid evidence such as plot borders and animal bones possibly from the 11th century suggest an older settlement or an estate at this location. Taking into account that this would be a logical place for docking ships coming to the town, it is also feasible that there would be some point of control here, monitoring the incoming ships. Considering the contemporary topograghy, the area of present-day Rådhuspladsen was then quite close to the shoreline, which could be another reason for the seemingly active use of this area – perhaps there was a second harbour or place for docking boats here?

An alternative hypothesis is thus the possibility of two – or more – centres in the area from present-day Rådhuspladsen (or even further towards the west) to Kongens Nytorv, in the form of large nobleman's farms or estates. This is seen in other comparable towns, like Viborg in Jutland, Wrocław in Poland and Skänninge in Östergötland, Sweden amongst others. The centres in early Copenhagen could have had different functions, forms of organisation and rulers. These could eventually have grown together or been merged under a common town ruler.

Activities

It has long been assumed that fishing was the dominant economic factor in the origins of Copenhagen, something which is all the more likely due to its placement by the coast of Øresund and its proximity to the emerging herring markets in Skanör and Falsterbo. In many places in the town, archaeological material attests that fish was an important source of nutrition. At a few locations, for example Mikkel Bryggers Gade, fish bones have appeared in such numbers and in such a way as to suggest fish handling on a larger scale. The clay-lined pits for fish at Kongens Nytorv dating from the 13th century are another example of the economic importance of fish in Copenhagen in the medieval period. At Rådhuspladsen, there were large amounts of fish bones in many of the pits. It is evident that fishing has been of great importance for Copenhagen in the early and high medieval period, but the evidence analysed so far is not sufficient for drawing more substantial or nuanced conclusions to the role of fish trading.

The excavation at Rådhuspladsen has yielded information about other early medieval activities. The most important might be the refuse in the many pits which indicate a considerable amount of iron working. Technical analyses of this material has revealed a versatile and non-specialised production, with several active workshops. Both primary and secondary smithing have been taking place, something which underlines the importance of the iron for early Copenhagen. The quality of the iron and the skills of the smiths seem to be average. Apart from iron, some evidence of Copper alloy smithing has also been found. The composition of the iron ore could indicate a provenance for the raw material to Sweden, Norway or central Europe. More secure methods for examining geographical origin of iron ore are currently being experimented on, but it is anyway safe to say that the iron seems to come from two different geographical areas outside of the local area of Zealand.

The analyses of the important iron working material will continue. The analyses will hopefully indicate whether the production was only for local use in the town or for wider distribution. The results could be a

key to understanding the kind of place that Copenhagen was in the early medieval period, and if iron working was something which helped decide the further development of the town. Iron may have well have had an important role for the town, which could have been a place where the raw material was taken and distributed further to the rural surroundings or other towns in Zealand. A possible distribution route for the raw iron or iron ore could have been from Skåne, via Øresund (the Sound) to Copenhagen, where the raw iron was worked into artefacts and distributed further into Zealand. It is generally believed that the early medieval iron production was something which was highly interesting for the king to take control over.

Other craft related evidence in early medieval Copenhagen is scarce. There is however some findings from Rådhuspladsen which could be important and in need of further study. The osteological analyses of materials from pits have shown some to have remains of bone or antler work debris, possible raw material for comb making and also some half-made combs. With further attention to this material, more remains could possibly be discovered.

Initiative and control over early medieval Copenhagen

Organisation, power and the significance of two churches

How organised were the initial activities of fishing and craft, and what trade was there and how was it organised? How much centralised control was there in early medieval Copenhagen? What can the churches reveal about the organisation of the place? What reasons might there have been for the hypothetical second church to be never mentioned in written sources? Is it possible to interpret the archaeological remains as evidence for some type of competition or power struggle in the early medieval period? These are all questions that arise when dealing with the recently recovered archaeological source material for the early urbanisation of Copenhagen.

An important key to understanding the early urbanisation of Copenhagen naturally lies in its functions – what kind of a place was it, and what occurred there? It may be argued that early medieval functions in Copenhagen, such as production and distribution of iron as well as fishing would have been under the king's control. However, there would have been local noblemen involved, who were present in the town and kept the activities and income under control. It is their presence that might be revealed by the possible existence of two churches.

Churches dedicated to St. Clemens are generally believed to have been built by the king sometime in the mid-11th century. 26 St. Clemens churches existed in Denmark, which is by far the most in Scandinavia. St. Clemens is the saint of metalworkers, blacksmiths, and seamen and the churches were often built in coastal towns and there placed close to the waterfront. The placement and dating suggestion for the St. Clemens Church in Copenhagen to the 11th century would fit well with these theories. It can therefore be argued that the king was in control of Copenhagen at an early stage. But what about the hypothetical second church? All in all the ^{14}C-dates suggest that this church could have been older, but still partly contemporaneous with the church of St. Clemens. What does this mean in terms of power and control over early Copenhagen?

The finding of the graves belonging to a second church is significant for several reasons. Firstly, they indicate dates that show that there has been activity in this location possibly as early as the late Viking Age. This in turn has potential to provide new information about the process of the Christianisation of Denmark. More importantly, the findings also reveal more about the type of place Copenhagen might have been during this period. If the hypothesis of two contemporary churches is correct, that would suggest more than one source of power present, with interests in the town in its early stage. This conclusion is drawn on the basis of theories which have been dominant in recent decades, which suggest that the early medieval churches were mostly private churches built by noblemen, or by kings and bishops. Also, when there is reference to parishes in the early medieval period, many scholars believe that they should be seen in a social and economic context, rather than a territorial one, representing a group of people connected to a leader/person with power. This could signify that before the king obtained control of Copenhagen, there might have been a nobleman present in the town. The nobleman might have built a church and was in that case most likely involved in the economic activities of the town at this point. However, there is nothing to suggest that there were no other actors like this in Copenhagen. Hypothetically, there could have been several different interests on several organisational levels present at the earliest stage of settlement.

Noteworthy in light of this, is the seemingly sudden change of use of the area which is now Rådhuspladsen sometime in the High Medieval period from being a busy area with craft/production activity, dwellings and a church and cemetery, to a more or less unused place where the town's fortification is placed, leaving most of the former busy area outside the formal borders of the town. Could this abandonment have been the result of a decision made by the town's ruler? Should it be seen as a deliberate erasing of a competitor's territory? Is that also why the hypothetical church is not mentioned in any historical sources? Recent studies on the theme of abandoned medieval churches in Denmark show that a large number of churches possibly existed during this period which did not survive into the High/Late Medieval period. One example of a town with churches abandoned in this period is Slesvig (present-day German Schleswig). A historical source from the 12th century tells of two churches, which later were abandoned, and there is archaeological evidence of even one more church, which is not mentioned at all. It would be interesting to examine and compare the situation in Copenhagen in this context. The questions surrounding the churches and the role they might have played in the early urbanisation of Copenhagen is an aspect which is definitely worthy of further study before new theories can be properly formulated on the subject.

A hypothesis regarding the development of the early medieval churches in Copenhagen could be thus explained: The suggested church to the north of Rådhuspladsen, possibly slightly older than St. Clemens, might have been a nobleman's church, belonging to a nobleman who was in control of the trade or parts of the trade over the Sound prior to the king's involvement. This nobleman perhaps later continued to be a force in the town, allied with the king, and taking care of the king's interests. At some point in the late 12th century, perhaps when the town was given to Bishop Absalon, his services would no longer have been required, and he would have lost his power. This could be why the hypothetical church and the cemetery were abandoned, and the area for occupation and production as well. The new ruler of the town, Absalon and his successors then began the work of building a town fortification which went right through this area, symbolically and physically leaving the earlier lord's land outside town.

Copenhagen - A politically strategic place in the 12th Century

It has been argued in this paper that the key to understanding the kind of place Copenhagen was, is the different activities we now have evidence for, or that from our current understandings we can assume to have taken place - craft, fishing, and most likely trade. It must be reiterated that the possibility of the existence of two mostly contemporaneous churches, too is highly significant. Combined with its central location in the Øresund area, it is possible that already by the early to mid-12th century, Copenhagen played a key strategic role in the region. It is likely that the town was some kind of hub for trade and travel, for instance between nationally important towns like Lund and Roskilde. Copenhagen was probably also a politically strategic location. It must have been increasingly important for the central powers in the early medieval period to have control over the passage between Sjælland and Skåne, both for political and economic reasons. Increasing conflicts with the Slavs in the south-eastern Baltic sea region, could have been an additional motivation to build a strong point of power here.

A town?

When did Copenhagen become a town? There seems to have been a gradual and perhaps fluctuating development in the 11th and 12th centuries. The *process* is more interesting than an actual "founding date", which would be a simplification. It could be that at a time when fishing, iron working and presumably trade were important functions in Copenhagen, and when there is likely to have been two churches in existence controlled by two different power figures, then there is an urban character to the place Copenhagen. Its primary functions might have been as a logistical, political and economic node in eastern Denmark. For the inhabitants, this had great effects. The activities and functions stipulated here were bound to have resulted in a type of life different from life in the countryside. Everyday practices, ways to arrange one's life, relations to other people co-existing in the town were different than in a village. This was a time when an urban way of life started to form in Copenhagen.

The fortifications of Copenhagen: The western boundary as seen at Rådhuspladsen

Prior to the excavations at Rådhuspladsen in 2011/2012, relatively little was known with certainty about the city's former western boundary. What knowledge was available mainly stemmed from cartographic sources and historical references, as well as present day street layout (particularly Vester Voldgade). The first map however was only drawn in 1590, and the first historical references for this area date to the later 1300s, when vesterport (the western gate) is mentioned for the first time. Part of the aim of the excavation then was to confirm or reject existing ideas about the city's border to the west, where it was placed, how it was constructed and when, and how it changed through time.

The evidence prior to the Metro Cityring excavation

The general perception has been that the medieval western boundary of Copenhagen followed approximately the line of present day Vester Voldgade (Western Rampart Street), with the medieval western gate placed outside of present day Vestergade (Western Street). Some small scale trenches opened over the years in connection with service trenches, as well as some larger excavations in the 1940s, have broadly appeared to back up this idea, though with little evidence seen for precise dating.

Some of the earliest references to the city fortifications from as far back as the 12th century refer to 'byens planker' the town planks or town fence, but this structure has never been seen archaeologically and we have little idea how it should have looked. Bishop Absalon acquired the town and built his castle in the 1160s, and it is generally thought to have developed quite quickly thereafter. A theory exists that the earliest town, dating back to the 1100s, was defended by a relatively small horseshoe-shaped enclosure (an area of c. 2 hectares defined by a ditch and embankment), located somewhat east of Rådhuspladsen, and extending eastwards towards Gammel Torv, and south towards the harbour. This theory is based partly on the shape of other Danish medieval towns, and on some smaller excavations in the city centre, the results of which appear to back up the idea of this horseshoe shaped defence. Being placed further east than the excavation at Rådhuspladsen (90 m at its nearest point), it was clear that no trace of this structure would be seen during the Metro Cityring excavation, but it would mean that Rådhuspladsen should lie entirely outside of the town as it was first defined. It has to be borne in mind that many of the excavations that support the idea of this enclosure were carried out as far back as a century ago, and hence they are not very thoroughly documented.

Evidence for the early town within this boundary has been scarce, but thin cultural layers containing Baltic Ware pottery and fishbone waste have been documented. Skt Clemens church is thought to have been established in the late 1100s (though it is first clearly mentioned historically in 1304), outside of the horseshoe-shaped enclosure, while it has been assumed that the high medieval defences, those placed by Vester Voldgade, were probably established in the second half of the 13th century to allow the town to expand. That said, the first documented references to a western gate come from well in to the 1300s. Overall it is not clear whether Skt Clemens church was inside or outside the town boundary when it was first established. The towers placed along the medieval boundary line were not erected until the early 1500s according to contemporary sources.

In the Roskilde bishop's land record from 1377, Vestergade is mentioned as "the street by Vesterport". In 1373 it is mentioned that part of Vestergade is called Smedegade (Smith's street), indicating that smiths or smithys were located in the area. The high medieval rampart is mentioned in the oldest town privileges from 1254 and therefore was apparently in existence by the middle of the 13th century. The rampart was apparently c. 2400 metres long and enclosed an area of approximately 70 hectares. The establishing of this rampart and moat structure is usually attributed to Archbishop Absalon around the year 1200, but it is uncertain how accurate this is, what form this early fortification actually took, and where precisely it was placed.

At the western side of town a small semi-circular roundel or ravelin was believed to have been built outside the western gate, probably in the first half of the 16th century. Written sources from the 1520s mention that men were paid to build an earthwork outside Vesterport, and as mapping from the 1590s appears to depict such a formation, the 'earthwork' may refer to this ravelin. A new outer gate building was established on the roundel. This gate is mentioned a few times in historical sources, though not in detail. From previous archaeological observations it is apparent that it was built of stone and bricks and placed so that the route through it was north south – at a right angle to the original gate. Having two co-existing gates would have provided easier control over who and what came into town, therefore playing an important defensive role.

Figure 121 The oldest map of Copenhagen from 1590

Regarding later changes to the fortification, Valkendorf is believed to have carried out improvements on the defences in the 1580s, while Christian IV is known to have had the fortifications modernized in this area from 1606 and onwards. Finally, as far as this area is concerned, following the Swedish siege in the 1650s,

the western fortifications were once again rebuilt in the 1660s, this time completely renewed in fact, with much broader bastions established and a very broad moat called Stadsgraven, all of which was moved further to the west than the earlier defences, with the moat largely occurring outside of the area of the Metro Cityring excavation. A new bastion called Schack's Bastion was placed in the northern part of the area where Rådhuspladsen is today, sealing over the former outer gate, which was partially demolished. A new western gate was established between Schack's and Gyldenløve's bastion to the south, outside of present day Frederiksberggade. In constructing this more modern set of fortifications, it was also necessary to fill in any deeper earthworks remaining within the new defences, such as the previous version of the moat.

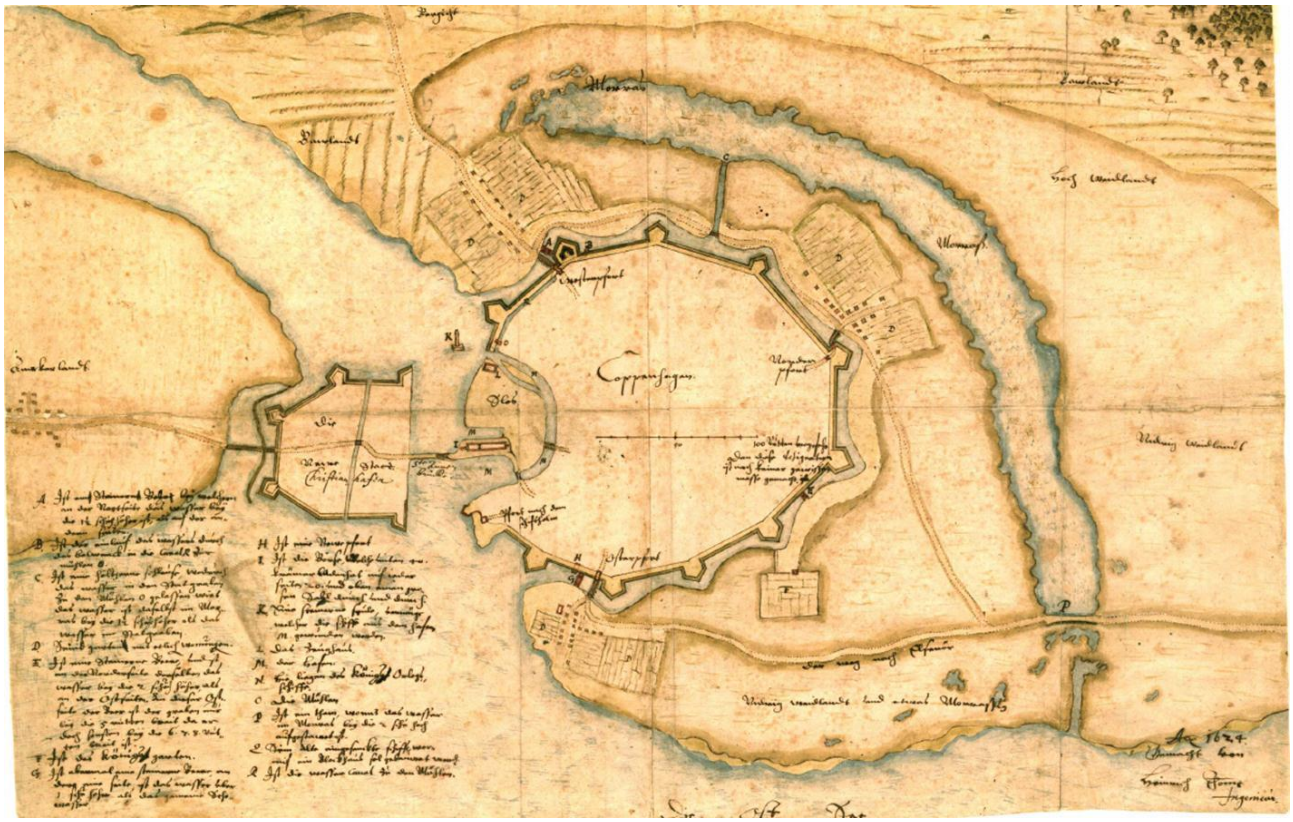

Figure 121 The Swedish Spy Map from 1624

The 1940s – the moat encountered

A number of archaeological investigations of various kinds have been made in and around the Rådhuspladsen area over the past century or so. The most significant as far as the fortifications are concerned however, were those carried out in the 1940s. In the autumn of 1941 a large area in the north-eastern part of Rådhuspladsen was excavated to facilitate the establishment of an underground public toilet. The excavations were undertaken with limited archaeological supervision. There was no report made of the archaeological findings, but notes and a handwritten manuscript for a presentation of the findings held at Rådhuset in December 1941 survive, along with a limited number of photos, some plans and sketches. These – together with the numerous newspaper articles about the excavations – give a somewhat fragmented picture of what was found, and where.

The interpretations made from the excavations were heavily influenced by historical records and what had previously been written by Chr. Ax. Jensen in 1938. In the north end of the trench a brickwork pillar was seen and recorded. This had a foundation of large boulders. North of the pillar part of a larger brick structure on boulder foundation stones was recorded. It seemed to be three sides of a square shaped structure of brick walls – the western part was apparently not excavated or was not preserved. The structure was interpreted as being part of the bridge running between the inner medieval gate and the outer gate built in the beginning of the 16th century.

Figure 122 The public toilet building construction site in 1941, seen from southwest

The area excavated in 1941 measured approximately 25 x 25 m and the trench was dug to a depth of at least 5 metres. However, it seems that some excavation work was done outside the area where the toilets are now located – the trench seems to have been extended to the north to investigate the brick structure that was seen here. A large amount of finds material was retrieved, consisting of pottery, metal and well preserved organic material. These finds would have been placed here during the filling up of the medieval and renaissance moat in the 1670s or so, when the large bastion fortification was built.

One photo from 1941 shows the trench after several metres of fill have been dug out. In the bottom a long north-south oriented line of transverse large wooden beams is seen. What appears to be the same structure is depicted in plan and section drawings, showing that the beams must have been placed on a long row of boulders. A brick wall is indicated in connection with this, but the drawing leaves doubt as to the location of this. From a series of plan drawings it is obvious that a wooden channel is running north-south above the transverse beams. The structures depicted must represent elements of the mill and millrace (built after 1600 within the medieval moat) which were removed during the excavation.

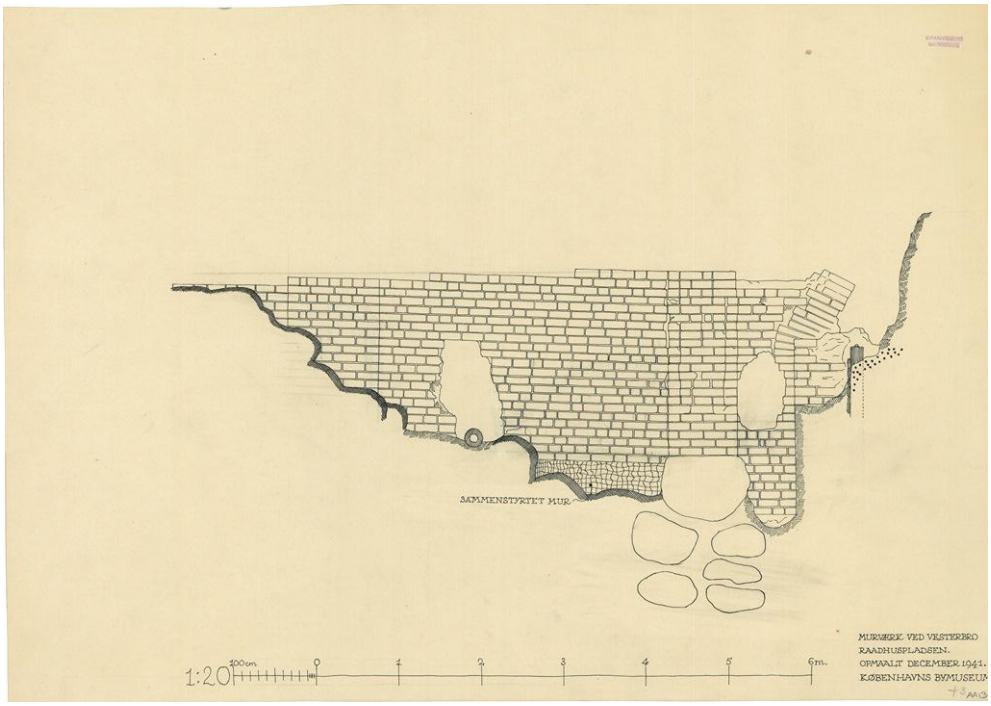

Figure 123 An elevation drawing of part of the brick bridge over the medieval moat made in 1941 during the toilet building construction.

Excavations for the placement of air raid shelters in 1944 were also documented to a degree. Two photos were taken when a bomb shelter was being placed in the middle of the square, almost in line with Frederiksberggade (Strøget) and Vesterbrogade. On this occasion a large brick and boulder structure was seen. Both the air raid shelter and the brick and stone structure would be encountered again during the Metro Cityring excavation.

The evidence from the Metro Cityring excavation

<u>The high medieval fortifications</u>

As expected from the outset, given its location, the Metro Cityring excavation at Rådhuspladsen produced a wealth of evidence relating to the city's former western defences, evidence which has helped greatly to clarify the picture in relation to both the form the defences took, and the dating of the various changes made. It has also unearthed interesting new evidence for how this area was utilized throughout the period of the town's existence.

Given that a fortification must have a number of different features in order to function, we can make certain assumptions regarding which structures were established at the same time. In order to keep out an enemy, a wall or rampart is needed, and generally paired with a parallel ditch or moat. In most cases we can assume that when the moat is dug out, the resulting clay material is used to form the rampart, so it is built simultaneously. Once this barrier is established, an enemy army can in theory be kept outside of the resulting defended area. But of course, on a day to day basis people need to cross this boundary, hence a bridge is required to cross the moat, and a matching opening in the rampart or wall. The bridge then presents a weak point in the defence, and so a gate and in most cases a gate building are needed in order

to control this strategic access point. Hence, we can assume that once the moat was established around Copenhagen, all these other elements would also have been required, at locations such as outside Vestergade where an access point was needed.

During the excavation at Rådhuspladsen in 2011/2012, these kinds of features were identified along the east side of the square / the west side of Vester Voldgade. The medieval moat was exposed for a distance of c. 44 m, and was seen to have measured c. 22 m in width, and c. 5,5 m in depth. It ran in a northwest to southeast direction across the excavation area, and extended beyond the limits of the excavation at both ends. The moat had been dug deep into the sterile clay and sand underlying the area, deep enough to reach the water-table, and hence the moat was certainly wet. It is also possible that the sea extended this far up the moat, as the base of the moat was slightly below (present-day) sea-level. The sides of the moat were quite steep, and would have presented quite an obstacle to any would be enemy. The rampart only survived in small fragments, so little can be said about its former scale or form, other than it seemed to be of clay, and that it was clearly placed on top of former urban activity areas, sealing such features as former road surfaces, pits, and even areas where structures (houses or workshops) had previously stood.

Therefore it is apparent that when this fortification was established, the town was rearranged to a degree, and some former urban space was taken out of use. Indeed, much pre-moat activity was observed outside of the moat, so in fact the town was to some extent 'pulled back in' from the west.

When the base of the moat was reached during the archaeological excavation, a large structure built of oak timbers was encountered, precisely in the area of the moat outside of present-day Vestergade. The lowest level of this structure consisted of huge timber piles driven deep into the clay at the base of the moat. The top of each of these had been fashioned into a rectangular tenon, and onto these were jointed a series of massive horizontal oak beams, running in a southwest to northeast direction across the moats base.

Figure 124 The oldest bridge beams exposed in the base of the moat

This structure appears to represent the surviving base elements of a rather massive oak bridge. Samples were taken from this structure to be dated using dendrochronology, and the resulting dates point to a construction date of about 1372 or just after. As no further structures were seen to predate this, then we can suggest that this bridge was almost certainly the first one constructed within this moat, and hence the moat and its associated rampart too are likely to have been established in about 1372.This dating was further backed-up following a final phase of watching brief carried out in February 2016, during which a small area of intact medieval moat fills were identified to the south of the bridge (under the former underground toilet building). Three samples were taken for C14 AMS dating, one from the deepest layer, and two from the second (and more organic layer). These produced date ranges spanning the 14th century (see Phase 3), and considered with the dendrochronology dates for the bridge, back up the idea that this moat was established in the mid to late 14th century.

To the immediate northeast of the moat, a substantial stone built foundation was discovered, with some traces of brickwork apparent resting on top of it. This foundation, while surviving only partially, points to a rectangular structure, measuring c. 9 m x 9 m, and placed directly in line with Vestergade. The foundations were 1,6 m deep, and comprised of layers of carefully laid stones, set in to either clay or sand. Given the depth of the foundation, it is likely to have supported a superstructure of somewhere between 3 and 5 m in height. This points to a rather substantial building, and given its location, this must represent the surviving remnants of medieval Vesterport. It is again interesting to note, that prior to the construction of this gate, there had been substantial activity in this location. It was clear that the foundations were dug through older layers, mainly street surfaces and associated layers of cultural accumulation. These layers, when investigated further, pointed to a pre-gate road leading east-west, and also a street surface extending to the south, associated with various pits and structural remains of early to high medieval date. These were then buried under a layer of sterile clay, material which seemed to be a part of the former high medieval rampart. In short, we are again seeing that prior to the construction of the medieval gate and rampart, this area had been part of the active urban landscape, and was taken out of use with the construction of the gate, rampart and moat. Given the dating of the layers the gate foundation was cut through, and its presumed association with the adjacent moat and bridge, the evidence available points to the construction of this gate also having occurred in about 1372.

Figure 125 The east corner of the foundation, mid-excavation. The foundation cut had clearly gone through several archaeological layers, as can be seen

So what does this evidence mean for the western part of medieval Copenhagen? Along with the quite clear dating evidence for the bridge and associated defensive structures, come some new questions. It was quite apparent from the evidence from pits, postholes and various layers, that the area where these fortifications were placed had been part of the urban area up until about 1372; in fact all indications are that this was a quite busy area since at least the 1100s, and that this activity extended even further to the west, with wells, pits and even a burial ground identified west of the medieval moat during the excavations. Then in c. 1372 the defences were placed here, with almost all activity to its west ceasing, and much of this former busy zone either dug away for the moat or buried under the rampart. It is perhaps more usual to think of towns and cities growing and expanding, but in this case, a conscious decision was made to take a substantial part of the urban landscape out of use at the expense of the new fortification. Why this was done is not clear. Many possible theories could be put forward, but only two seem plausible.

Establishing the moat would have been a quite massive undertaking. As seen during the archaeological excavation, it measured c. 20 m in width, and c. 6 m in depth. If the town as it existed in 1372 had become somewhat irregular in shape and layout, if it sprawled outwards in various areas while perhaps there were still open spaces within its more core areas, it may have been more expedient to rearrange the urban space somewhat, in order to reduce the length of the new moat. It might have been decided to relocate some of the peripheral activity and instead to ‘fill in’ areas deeper within the town, resulting in a more dense and perhaps more organized medieval city. Such consolidation of the urban area might have reduced the required length of the new moat significantly, which would have made a substantial difference to the amount of time, labour and money required to construct it.

Alternatively, perhaps this area was closed down for more strictly defensive reasons. Perhaps the topography was such that it dictated where the fortification should be placed to be most effective. Or

perhaps more likely, a more compact town with a reduced coastline may simply have been easier to defend, with a shorter fortification to protect, and less exposure to the coast. Exactly what the reasons were, we will probably never establish with certainty, but perhaps the theories outlined here come some way close.

A further question raised by the evidence discussed above, is where was the town defence located prior to the 14th century, or in fact was there one? As we have seen previously, there is a theory of a horseshoe-shaped enclosure to the east, but the area of urban activity seen at Rådhuspladsen falls well outside of this possible defended area. So we have a scenario where in the years leading up to 1372, substantial parts of the urban area may have stood undefended outside of the town core. Alternatively, an as yet undiscovered fortification lay further to the west than the area excavated at Rådhuspladsen, enclosing the entire area. One final possibility remains, and that is that there might have been an older less substantial fortification following essentially the same course as that of the 14th century version, so that the earlier version of the moat was fully removed by the newer version, and the new larger rampart could only fit by covering part of the town area. This scenario is perhaps the least likely however, for one main reason. If one was to enlarge an existing moat in this way, it would surely make more sense to expand it outwards, away from the town.

When considering these issues, it is worth considering the fact that the first historical reference to any western gate in Copenhagen was in the 1370s, which supports the idea that the first western gate was only built at about this time. It may well be then that a substantial part of the town was undefended up until 1372. Further muddying the waters is the fact that emerging evidence from the Metro Cityring excavation at Kongens Nytorv appears to indicate that the eastern part of the high medieval fortification was already established by the 1200s. Unfortunately, while the evidence from Rådhuspladsen has answered many questions about the medieval defences, some mysteries still remain. One fact that is worth consideration however, is the attack on Absalon's Castle by the Hanseatic League in 1369. In aggressively defending their trading monopoly, they plundered and razed to the ground the castle built by Absalon. Whether or not the town next to the castle was attacked is not documented, but it is rather unlikely that it went unscathed. In light of this, it seems very likely that the new fortification by Vesterport was built at least in part as a reaction to the hostilities perpetrated by the Hansa.

As far as the archaeological evidence goes, there is little indication that the fortifications by Vesterport changed very much from 1372 up until about 1500. The one change of note was a rebuilding of the bridge. This was seen in a series of dendrochronology dates from a secondary wooden structure placed on top of the original bridge base, which were dated to c. 1438 This new structure also included a wooden platform on the west side of the moat which seems to have been placed in order to support a large foundation of natural boulders.

Figure 126 Bridge timbers from the second bridge exposed crossing base of moat, boulder foundations seen in section

These in turn seemed to have been placed in the moat to form a solid foundation for a new bridge of brick and perhaps stone. Very little of the super structure survived however, just two platforms of brick, where the bridge would have rested on the boulders. Hence little can be said about this bridge, other than it must have been seen as an improvement on the original bridge, perhaps due to being stronger or more of its time.

The fortifications from c. 1500

A series of developments were seen in the area of the moat, which again using dendrochronology dating, appear to have taken place in about 1500. The most substantial of these was another rebuild of the bridge. Substantial parts of this third and final bridge over the medieval moat were seen in 2011/2012, including bridge abutments on either side of the moat channel, and the lower part of the arch on the west side of the bridge. Timber uprights were found both in front of and behind the abutments. Several of these timber elements, thought to be associated with the construction of the bridge (perhaps as scaffolding), were dated by dendrochronology to around the year 1500, hence giving a strong indication as to when this version of the bridge was constructed. It was apparent once exposed, that it was parts of this structure that were seen north of the public toilet building construction in 1941 (see Figure 122 and Figure 123).

Figure 127 The western side of the bridge arch, with foundation boulders and timber uprights visible

This bridge was well constructed, with foundations of large cut stone underlying the well built brick superstructure. Buttresses were added to the sides of the bridge at some point however, suggesting that there may have been concern over the stability of the side walls of the abutments. Again it is unclear why a new bridge was needed, it may have been related to changing architectural styles, or perhaps the previous bridge was not deemed to be strong enough to withstand an attack. A lightly built fence or revetment of in many cases recycled timbers was also constructed at about the same time, running along the inner edge of the moat, and curving outwards to meet the bridge. These stakes of oak had been pointed and driven into the sterile clay the moat was dug through. Horizontal beams were also laid, resting on the upper side of the stakes. Their placement here, at about the same time as the bridge was rebuilt, points to a large program of rebuilding and improvement of the defences being carried out in about the year 1500.

Figure 128 The revetment stakes exposed in Area 3

It was about 30 years later that we see the first evidence for a change (or in this case an addition) to the actual moat itself. In about 1530 (based on both dendrochronology and C14 evidence), a new element was added to the moat, in the form of a semi-circular moat or ditch, placed outside of the medieval gate and linking back into the main moat at either end. This type of structure would form a secondary layer of defence, and create a semi-circular and easily defended island outside of the gate. This kind of defensive element is known as a demi-lune (half-moon), and was first developed in the early 1500s. The example seen at Rådhuspladsen was relatively small, with a ditch that had a maximum width of 10 m and a depth of c. 1,8 m. It may be that it was in fact too small to be a meaningful deterrent for attack; either way, it appears that this arrangement did not last very long before a substantially larger version was dug, slightly further out, and with a second gate also added to the layers of defence.

It was this version that was depicted on the oldest map of Copenhagen, from 1590 (see Figure 121), but it appears to have retained the curved shape of the demi-lune, but on a grander scale. This outer gate was unearthed in 2011, and survived as two parallel foundations of huge boulders, and the remains of a huge cut stone and brick façade. The structure, as it survived, measured 10,6 m in length, and 12 m in width, and its façade faced to the southeast. The southeast corner of the façade survived to the greatest height, being c. 6,5 m in height. A linear air raid shelter had been constructed in such a way that it had caused the partial removal of the gate façade, hence we can say that the outer gate was the structure encountered and photographed in 1944 in the middle of the square (see above).

Figure 129 The outer gate façade seen from the south

As can be seen in Figure 129, this gate would have been an imposing structure, and was clearly built to withstand cannon bombardment. The façade was faced entirely of cut stone up to a height of about 3 m. These were very substantial stones, rounded at the back, but with flat squared fronts, and lay in five main courses. Behind these were more randomly shaped stones as well as brickwork, and the entire structure was bonded together with mortar which was still extremely solid during excavation. Underneath the cut-

stone base, a single course of un-bonded irregular rocks were placed as the primary foundation layer for the structure; these were lodged in clay.

On top of the cut stone section of the wall a brick superstructure was built. This survived to a height of 2,25 m. It could be seen that the base of the gateway/road surface had been at a height of ca. 4,3 m above the base of the foundation, and had an internal width of between 6 m and 7 m. The gate façade had overall external dimensions across the front of 11,9 m, and a width from front to back of 4,4 m. When one takes into account the deepest layer of foundation and the buttress additions to the eastern end, then the dimensions increase up to 13,3 m in length across the front. The façade was an extremely durable structure, with an internal structure of criss-crossed brick courses and stone which would probably have made it capable of withstanding quite heavy bombardment.

The precise date of construction for this gate is not entirely clear, and unfortunately the archaeological excavation did not provide solid dating evidence. We do know however, that a substantial part of the foundation was constructed across the former demi-lune ditch, which means that it post-dates 1530. Furthermore, the gate is depicted on the earliest map of Copenhagen which was drawn in 1590. Written records suggest that it was in 1543 that the roundel or demi-lune was either rebuilt or extended. This could suggest a possible date for the construction of the outer gate. In A.D. 1583 Christopher Valkendorff, King Frederik II's "rentemester" (Minister of Finance) according to written sources established "a vault in Vesterport between the two gates". This reference shows that by A.D. 1583 at the latest, there most definitely was an outer gate in place. The results of an excavation here in 1931 suggested that the gate façade was placed on the outside of an earlier façade, and that it was thought that these changes might have been related to Christian IV's redecoration of the gate house beginning in A.D. 1618-19, described in written sources . It was not clear from the recent excavations if there had been a renewal of the façade or not, but it cannot be ruled out. The partial remains of four bridge piers were also seen, two abutting the gate façade, and two placed further out in the moat. These were constructed of brick, with stone foundations.

The moat associated with the outer gate, as the mapping from 1590 and 1624 hints, was changed a number of times. From what was seen during excavation, the moat was originally curving (in an approximate C-shape if we trust the 1590 map), and extended eastwards beyond the gate (towards the town) for c. 19,5 m, before turning sharply southeast towards the harbour. At some point its shape was adjusted, in order to have a more angular profile in the form of a bastion, and the part that extended eastwards beyond the gate was completely filled in. Historical sources suggest that it was in A.D. 1618-19 that these changes were made, in order to model the fortification on Dutch and Italian models. Certainly, when the Swedish spy map of 1624 was drawn, the bastion was in place.

The bastion was known as Vesterport's bastion. Part of this was seen during the 2011-12 excavation, to the west of the outer gate. This consisted of a section of cut stone wall that projected out from the west corner of the outer gate façade at an angle, and slightly further west – on the other side of a deep modern disturbance – a substantial piece of walling built up against the natural clay subsoil, with the moat backfills to its south. The stone facing of this had mostly been removed, leaving mortar and bricks behind, but it was clear from the very large stone sockets that there had been a stone face to the structure originally, up to a

height of at least 3 m, and from there up it was brick faced (Figure 130). This was a similar construction style to the outer gate facade.

Figure 130 The robbed-out face of the bastion

This structure was built in a fairly typical way for a bastion, with a sturdy inclined encasing wall facing any would be attacker, and this backed up with clay (clay would have been filled in behind its upper part also, though this did not survive). This created a very durable structure, which would be able to absorb cannon ball impacts. In total, 23 m in length of this bastion wall survived. Perhaps as an outcome of the Swedish siege of the 1650s, it was decided by the 1660s that the fortifications were no longer good enough along the west side of the city, and so in about 1668 a new fortification was constructed in this area, more in keeping with what was already in place along the east side of the city.

The western defences from c. 1668

Relatively little of the last fortification built in this area was seen during the excavations in 2011/2012, as the moat was located almost entirely outside of the area of the Metro Cityring development, further to the west, and the rampart was entirely removed in this area in the later 19th century. Parts of this moat still exist further to the south however, within Tivoli, and parts of both the moat and rampart survive further north in HC Ørsteds Park. Some direct evidence for this fortification was encountered on site, both as structural elements, and in another sense as evidence for the decommissioning of the previous fortifications; the partial deconstruction of the outer gate, the filling up of the moat, and the deconstruction of the medieval gate and of a mill which had been placed within the original moat in about 1606. The structural elements of the 1668 fortification seen included a brick wall, and the remains of a gatehouse building. The material used to fill up the older moat elements was largely comprised of urban waste material, and in itself is a source of much information about life in 17th century Copenhagen, being incredibly rich in cultural material.

The remains of a redbrick wall were found, placed quite centrally in the square, and with a southwest-northeast orientation. An examination of available mapping and some illustrations from the 19th century suggest that this wall, based on its form, was almost certainly part of the flanking wall which led from the gate out towards the bridge over the moat, in effect connecting those two structures.

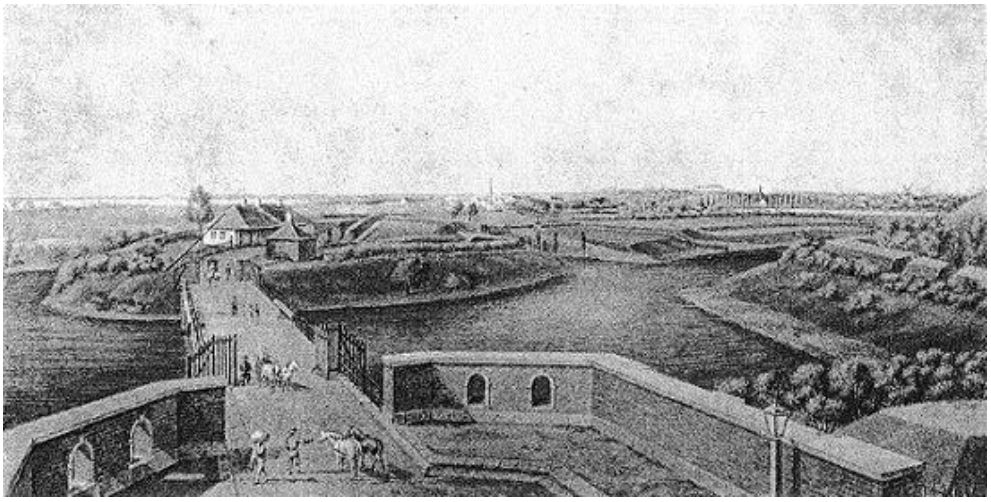

Figure 131 A depiction of the flanking wall by vesterport, from a painting by FL Bradt (c. 1800) and reproduced by F Hendriksens (Dansk Centre for Byhistorie)

The wall survived up to five courses in height, and in some areas foundation stones were observed. The wall remains were not very deep below the present day ground surface of the square, so it is likely that any future work on the square might expose elements of this wall and the associated gate foundation.

Figure 132 The wall seen from what would have been the outside (from north)

A number of elements of the gatehouse building were documented 30 m northeast of the wall described above, roughly in the direction of present day Strøget. This building was located just to the north of the inner side of the western gate, and is seen on a number of paintings. Its size and position as seen on site seems to correlate well with these. Dendrochronology dates point to a likely construction date for the gatehouse of c. 1677, suggesting that the gatehouse was built some years after the gate itself.

The building survived at foundation level only. The foundation of the main structure was constructed from a number of different elements; firstly a linear foundation cut was made into the soft organic moat/millrace backfills below, then a series of foundation piles were driven down through the base of this cut and in to the soft layers below. These were placed in sets of three, each set taking up the width of the base of the foundation cut.

Figure 133 Gatehouse foundation seen in section

The piles were of oak, and were each 1,25 m long, and placed between 2 m and 3 m apart along the base of the foundation cut. On top of the outer piles and supported by them, linear beams were placed horizontally within the foundation cut, running parallel along its edges with a row of sizeable stones placed in the gap in between. Clay was packed into the foundation cut around all the elements, to hold them together. The top of the foundation was at a height of 5,05 m above sea level. Overall the building was quite substantial, measuring almost 13 m in length, and almost 5 m in width. An element of a probable rear-annexe to the gatehouse/guardhouse was also seen. This comprised of a foundation cut, and a combination of stones and broken bricks laid in random fashion within to form a foundation, upon which was placed a brick and mortar laid foundation. This was probably a later extension to the building.

Fortification no more

Traces were also seen during the excavation of the deliberate deconstruction of many of the later fortification elements, including the infilling of the moat itself and the deconstruction of the gatehouse/guardhouse. This was done in the later 19th century, because by then the traditional form of urban defence – moat and ramparts or wall in close proximity to the city – had become obsolete, based mainly on the developments of warfare. The defences in the area of the western gate – which could have been left in situ even if obsolete – were removed as part of an opening up of the western boundary of the city, allowing for the modern city to expand in that direction, and also allowing for the future creation of a public square in this location.

The absolute final traces of defence related structures on Rådhuspladsen came in the form of air raid shelters from the 1940s. Two types were seen, domed shelters (in every case dismantled), and linear shelters (some were still intact). While these structures were not designed to keep an enemy out (impossible in an age of aerial bombardment), they are nonetheless evidence for defence related activity and stretch the evidence for war and defence in this location to almost 600 years, representing continuity, even through great changes.

Figure 134 The eastern part of the shelter in Area 2B. Seen from north

Figure 135 The interior of the shelter in Area 2B. Note the wooden panel and wires to the right, and the ceramic pipe in the corner

A moat re-imagined – the mill by Vesterport

The medieval moat along Copenhagen's western boundary, as constructed in about 1372, was the main defense line in this area for over 200 years. In the late 1500s however, large-scale changes to the defensive arrangement in this area saw the construction of a ravelin or bastion, the digging of a new section of moat further to the west to surround this, and the addition of a second gate on the bastion. By about 1600 then, the original moat, at least in the environs of Vesterport, was at best of secondary importance, and at worst it had become redundant. As a result, it was decided at about this time to take it out of use – as a moat – but to reuse it instead for a more practical non-defense-related purpose. It was decided that given its depth and topographical location, it could be re-formed to contain a mill race and mill, without as much digging required as an entirely new mill race. It is clear from mapping evidence that it ran inside and parallel to the 17th century western rampart. The mill was according to sources used to grind flour and malt, both for the castle and for the town residents.

Historical information regarding the mill

Some historical references to the mill at Vesterport survive, particularly from the rentemesterregnskaber (accounts of the Kings treasurer). The references below were assembled originally by Bjørn Westerbeek Dahl and Inger Wiene (Københavns Museum). Additional comments by the author.

May 1606 – Christian IV agrees with carpenter Dyrch Frii that he will build a mill by Vesterport, of both timber and brickwork, as well as a vault to carry the water under the road. The cost would be 1200 daler.
1607/1608 Financial accounts show that building master Didrik Frij (presumably the same person as above) was paid to construct the mill by Vesterport. The construction of a foundation for the mill is specifically mentioned.
1612 Timber work carried out on the mill.
1613 A carpenter is employed to build three wheels for the mill.
1618 A dam is built north from Vesterport, and some of the dammed water was to be allowed via a vault through the rampart to drive the mill. This suggests that the moat north of the gate is now also replaced with a new moat further west than the medieval moat. Vitt Kragen is the carpenter for the mill now.
1619 Frames delivered for around the millstones
1620 Soil removed from the vault under the bridge (presumably silted up soil). Repairs made to collapsed parts of the vault.
1620/21 Blue clay delivered for the sluice for the mill.
1621 A carpenter was paid for work carried out on the mill race in July, and again in December. Carpenter Abraham Krug was paid for going to Skåne in Sweden to collect beech timber and a mill stone for the king's mills, including that at Vesterport. *Note: Several timbers from the mill race as seen during excavation were dated by dendrochronology to about the year 1620/21*.
1624 Builder Christoffer Flecke built some walls, improved the roof and also the baking oven at the mill by Vesterport.
1624 The new sluice is 'smeared with tar'.
1626 Carpenter Frederik Christian is paid for two large water wheels for the mill.
1629 Knud Svendsen is the miller at Vesterport. Mention of rye, wheat and barley being ground, some of it for course-bread (grovbrød).
1635 Mill rebuilt with a 'large building'
1636 Anders Koch is appointed miller. Work carried out on the mill building. 6 mill wheel/parts to be scrapped if they are in poor repair.

1643 Brick laying carried out on the building. Some kind of deconstruction and reconstruction carried out on 'the millhouse by Vesterport'.
1656 Mill mentioned again, as 'the mill established by Christian IV'.
1668 The dam associated with the mill came down, and with Vesterport being moved and a new moat being established, it was decided that the mill should be deconstructed.
c. 1674 The mill was deconstructed about this time. Christian V writes in May 1674 that a Johan Baneermand has sought compensation for his mill by Vesterport being rendered useless by the changes carried out to the fortifications in 1668. Thus suggests that the mill had been sold sometime in the years before 1668.

Previous archaeological encounters with the mill

Between 1941 and 1943 an underground public toilet building was constructed at Rådhuspladsen, very much in the same area that the Metro station is currently being built. There was an archaeological presence on site, albeit no report was ever written. Nonetheless, some information regarding this work can be gleaned from contemporary newspaper articles and some brief museum archives.

A photo from 1941 shows the trench after several metres of fill have been dug out. In the bottom a long north-south oriented line of transverse large wooden beams is seen. What seems to be the same structure is depicted in plan and section drawings, showing that the beams must have been based on a long row of naturally-shaped boulders, as well as some which had been worked. A brick wall is indicated in connection with this, but the section drawing leaves doubt as to the location of this. From a series of plan drawings it is obvious that a wooden channel is running roughly north-south above the transverse beams, and this is also depicted on an axonometric drawing of the same structure.

Various newspaper articles from the time with interviews with museum staff, provide some of the most useful information regarding the dig in 1941.

"The last thing we found was a layer of heavy beams/logs and boulders" (Chr. Ax. Jensen 1941_11_08 Ekstrabladet)

"Just south of the bridge there was a water mill of which several traces were found". "In the moat a wooden drain was found – used for draining the water from the mill". "It was demonstrated that the whole base of the moat was laid with beams/joists forming a base for the sluice of the royal water mill. The mill was situated in the middle of Rådhuspladsen. Towards the north – towards the Utrecht-building – the water was dammed causing a "fall" driving the mill wheel". "It was seen that the mill wheel was driven with both "underfall and overfall"" (1941_11_10 Politiken).

Figure 136 A rare photograph from the 1941 excavation that appears to show the base of the mill – the wheel or wheels would probably have been located directly over the timber structure seen in the centre of the area

Archaeological evidence and historical sources

As seen above, there are quite a lot of references to the mill from the 17th century, though these tend to deal mainly with finance related matters, and basic information regarding repairs and reconstructions. One of the aims of the excavation of the mill remains would be to see if these records were accurate, and to attempt to make a reinterpretation of the brief results of the previous excavations in the 1940s.

The main central part of the former watermill as seen in Figure 136 above, unfortunately was entirely removed in 1941, apart from the very deepest part of the foundation. Nonetheless, many other parts of the mill and mill race had survived in quite good condition and were thoroughly documented. The headrace which brought water into the mill was documented in a number of parts and areas including a dam and a sluice, the eastern side of the mill building was still partially extant even including its wooden floor, and the tail race where the water exited the mill had also survived quite well. A full account of these elements is contained in the first part of this report, and also in the full excavation report for Rådhuspladsen – hence it will not be repeated here. What is key to point out however, is that the timber elements of each part of the mill that survived were generally in excellent condition and consequently many samples could be taken to be dated using dendrochronology (tree-ring analysis).

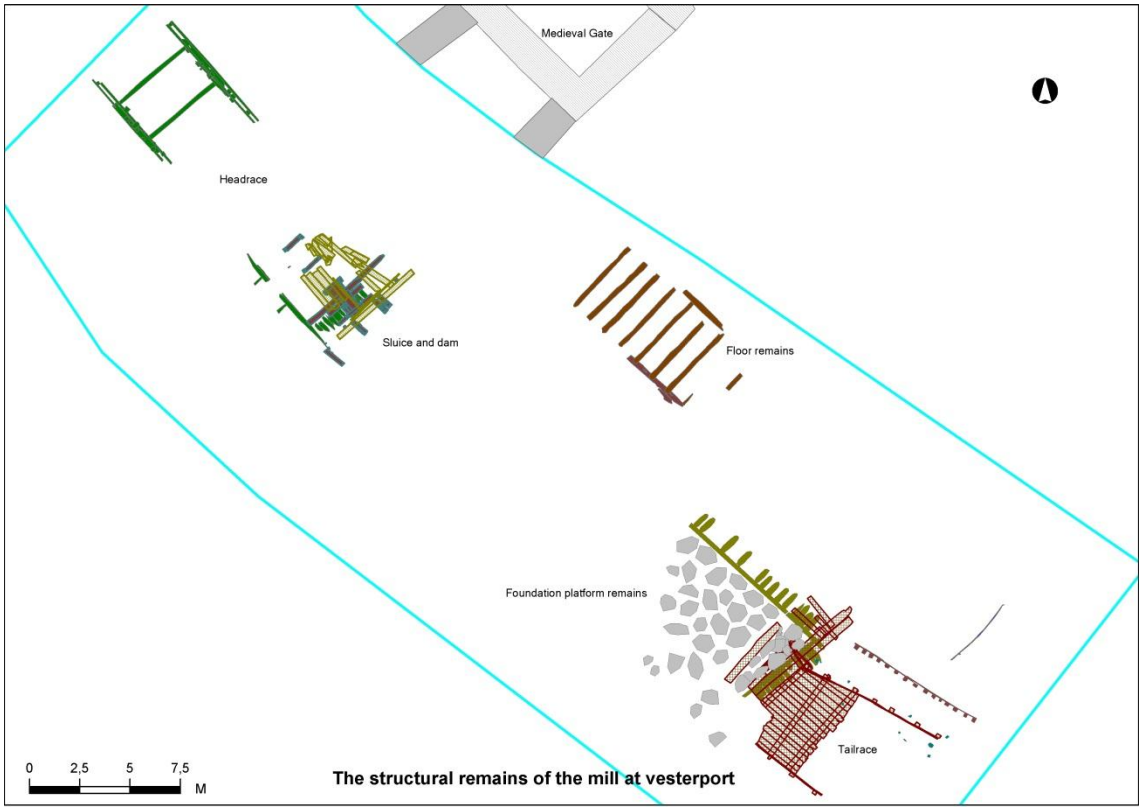

Figure 137 The structural mill remains as seen during the Metro Cityring excavation. The blue line indicates the approximate outline of the medieval moat

Figure 138 The southern edge of the mill construction platform, seen from southeast

Several elements related to both the construction of the mill itself and its tailrace were documented and sampled for dating purposes. The construction platform (seen above), provided a series of dates in the early 1600s, with an indication that the timbers were felled in 1606. This corresponds very well with the

historical references to the construction of a mill in 1607/1608, and it is likely that the boulder and timber platform (seen above) is precisely the foundation of the mill mentioned in the historical sources. It is surely this structure that was mentioned by Chr. Ax. Jensen in his newspaper interview in 1941, at which time some at least of the structure must have been exposed if not removed.

Figure 139 The upper (later) part of the head race within the former bridge arch, where it would have entered the mill. Seen from southeast

The mill head race which led water into the mill, was documented in a number of parts, and was interpreted as having been changed a number of times. The later version (seen above), provided a range of dates, but taken together they suggest a rebuild of the head race as late as c. 1663/4. The historical sources do not mention any rebuild of the head race at this time, but it may be that as the mill seems to have been in private ownership by this time, then the state treasurer would not have been involved in paying for the work and hence it was not documented.

The work must have ultimately proved to be largely a waste of time and money, as the mill would within a few years be rendered useless by the changes made to the fortifications. It appears from its form that in these later years the mill was used as an overshot mill.

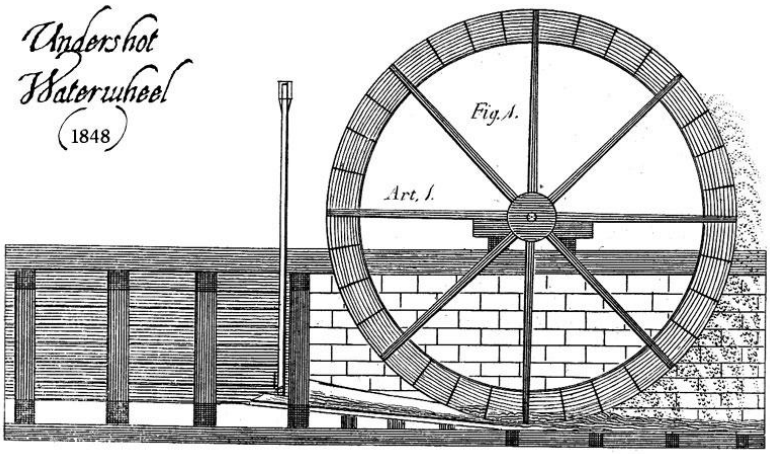

Figure 140 A depiction of an undershot millwheel from 1848 (http://www.engr.psu.edu/mtah/essays/threetypes_waterwheels.htm)

Figure 141 The lower sluice element of the head race exposed within the bridge arch. Seen from northwest

The deeper and older version of the head race (seen above) was seen to include a narrow wooden sluice and control point, suggestive of an undershot wheel. This structure provided a number of samples, and these returned a range of dates from the 1600s, which means a precise dating is somewhat difficult. Overall the evidence suggests that the sluice was constructed at the same time as the mill, but was repaired in an ongoing way over the next few decades.

The tailrace structure also survived in excellent condition, and provided many excellent samples useful for dendrochronology analysis. The dates received were again varied, but pointed to a construction at about the same time as the mill, with various repairs over the years, particularly around 1620 and possibly in about 1627. The dates from 1620 correspond very well with the documented work carried out in 1621 by

Abraham Krug. The timbers dated to 1620 however are of pine, whereas beech is mentioned in the records. It is stated that the timber was sourced in Skåne in Sweden, while the identified samples seem to have originated further north in Södermanland. It may be that the timber was simply purchased in Skåne, but originated further north.

Figure 142 The tailrace seen from southeast

Figure 143 The east side of the mill building, with stairs beyond, and floor in situ, seen from southwest

The floor of the mill building (seen above) provided five dendrochronology dates, mainly from the more sturdy cross beams. Some of these may have been original pieces from the mills original construction, but at least two appear to date to about 1632, suggesting a re-laying of at least part of the floor at about this time. These timbers originated in Småland in Sweden. This phase of replacement may correspond to the reference in 1635 to the mill being rebuilt 'with a large building'.

Conclusions

The excavation of the mill at Rådhuspladsen conducted in 2011 and 2012 provided many interesting details regarding the construction and form of Christian IV's watermill, and also regarding the many alterations and repairs made to it over the years. The survival of many timber elements in excellent condition meant that dating using dendrochronology was a possibility. Comparing the recent findings (in particular the dendrochronology dates), along with the scant evidence from 1941, with the original sources referring to the mill offers a rare opportunity to compare detailed archaeological findings and scientific dating with contemporary documentation.

One of the inescapable conclusions of this analysis is that the mill appears to have been rather ineffective, with repeated attempts to improve it apparent from both the historical records and the archaeological evidence. It may be that the mill was placed here largely at the behest of the king, who sought to make use of the by then redundant section of moat. However, not every idea based on productivity is a good one, and it appears that the location was simply not suited for a water mill, with insufficient change in the local topography the likely reason that the mill failed to be productive (another of words, a lack of sufficient fall in ground level to generate enough power in the mill wheels). The combination of archaeological and historical evidence employed here, allows for a very detailed level of understanding of this interesting structure, the king's mill by Vesterport, and gives us a picture of an ongoing struggle to make this structure productive and profitable, against the odds.

Footnote: The oven

Within the part of the mill where the wooden floor survived, an assemblage of almost 200 fragmented as well as complete oven tiles was recovered. As these were found in a relatively small area, it seems likely that they had been part of an oven located within the mill, perhaps broken up either following the mills abandonment or just prior to its deconstruction. Of interest regarding this find is the mention in the sources listed above to the improving of 'the baking oven' in the mill in 1624. Could the tiles found in 2012 belong to this very oven? While tile ovens were not typically used for baking, the possibility is worth consideration.

The tiles themselves were rather interesting, many of them bore the images of contemporary monarchs and famous persons from around Europe, such as Anne of Austria 1573 - 1598, Queen consort of Poland and Sweden and her husband Sigismund III Vasa 1566 - 1632, King of Poland and Sweden, and also James VI of Scotland (also James I of England) 1566 – 1625 (married to Anne of Denmark), which suggests that the tiles dated to the late 16th or early 17th century. It is interesting to note that many of the people depicted were famous Catholics, which at the time in question, is somewhat surprising as Denmark was at the time rather anti-Catholic. It seems that to the tile maker and to the oven builder and owner, this did not matter, or at least did not prevent the oven from being constructed.

Figure 144 and 145

Sigismund II Vasa and his wife Anne of Austria

Urban waste as a source of information. The 17th century Copenhagen moat backfills and what they can tell us.

Introduction

The Rådhuspladsen Metro Station excavation saw the archaeological investigation of a substantial part of the former city moat, a moat which had been filled up with urban garbage in the later 1600s. The excavation was located in the environs of the former western gate, moat and bridge. The section of moat relevant to this discussion was initially replaced in about 1600, as part of King Christian IV's programme of bastion construction. However, it was not yet filled in, but was instead reused as a millrace for a watermill that was built inside the bastion. In the late 1660's, an even larger set of bastions were constructed. It was at this time that the mill was taken out of use, and the former medieval moat was filled in (Fig 146).

One of the aims of the excavation was the examination of the cultural material that was used to fill in the moat at this time; a vast assemblage of 17th century urban rubbish, dumped in moist anaerobic conditions that allowed for excellent preservation of organics. The find material from the moat must have been taken from places like workshops, houses, town squares and streets, and as such it was recovered in a secondary context. The sheer volume, diverse range, and the level of preservation of the assemblage holds huge potential. We can use this resource to understand more of 17th century Copenhagen life. Also, as the assemblage is the product of the rules of waste collection and disposal at the time in question, we can also attempt to understand something of these rules, and of the society that formed them.

Figure 146 The partially excavated moat at Rådhuspladsen

The Historical background

In order to understand the processes which caused this waste to be placed here, it is necessary to examine the historical sources regarding rubbish handling in Copenhagen in the post-medieval period. Little enough is known of the situation in the 1600s, but the picture from the 1700s is clearer, and it is likely that the situation had not changed very much. We know for example that it was the responsibility of house owners to keep the street and gutter in front of their building clean. A horse driven rubbish cart picked up the rubbish, and the driver rang a bell so that people knew to take out their rubbish. The *vognmændene* or cart-men were appointed to their task by the magistrate.

A regulation was documented in 1647 relating to the significant problem of rubbish building up on streets, squares and along the rampart. Part of the solution was having cart-men assigned to specific streets and areas, and it was stipulated that their carts must be in good condition, solid and water-tight so that waste would not escape. They were paid according to the size of the load (10 skilling for a large cart). If a house owner wished to remove their own rubbish, they could do so, but presumably had to inform the authorities. It was stated that manure and foul butchers waste could not be taken out to the street unless a cart was already ordered to take it away. Human waste could not be taken out to the street, nor dead animals; this was dealt with separately – the *natmand* (night man) or *rakker* was the only one who could remove it. This material did not appear to show up in the moat backfills, so it seems that this waste was not seen as appropriate material for in-filling of this sort, and that the rule above was adhered to. Given the amount of waste needed to fill in the moat, it is likely that apart from the exceptions noted above, the waste collectors would not have been very discerning in their work, so the assemblage from the moat is probably quite representative of the city as a whole.

A statute from 1680 states that the cart-men are to come every morning once the city gates open to remove the waste and that they should take it to a place that the Kæmner (administrator) 'depending on time and place' has ordered them to place it. Presumably then, the Kæmner would be informed of the decision to fill up the moat with waste and would pass this on to the cart-men. Given how quickly the moat was filled in, perhaps all cart-men across the whole city were ordered to dump waste in the moat during these years. It is impressive that the city was producing enough waste to fill the moat, in what seems to have been quite a brief window of time, when Copenhagen had a population (in 1660) of about 23,000.

Excavating the moat

The volume of deposits excavated within the moat was so large (approximately 900-1000 m^3) that they were only partially dug by hand, using a mini-digger in tandem, in order to proceed at a reasonable pace. The mini-digger, supervised by an archaeologist, loaded the soil it excavated into cubic metre 'big bags'. A proportion of them from each major moat deposit were kept as samples, and later systematically sieved for finds, bones and other material. This was done in parallel to the hand retrieval of finds by archaeologists. The area was also metal-detected, to help recover smaller metal finds.

The finds recovered from Rådhuspladsen were registered and examined by a range of different finds and environmental specialists, with the aim of documenting the assemblage in a detailed way, and gaining as much insight into the material as possible.

Figure 147 Moat deposits being excavated

The moat fills were often substantial in scale, and differences in consistency, content and inclusions were seen between different layers. This suggests that waste from specific non-domestic sources was also dumped here, perhaps having previously rested elsewhere. It may be that manure heaps from stable areas, piles of waste collected in markets, or by-products from craft areas, were collected and dumped here, and already had to some extent a distinct form. Clusters of find types were evident, for example a large dump of charred cereal in one area, a substantial cluster of cow metatarsals in another area, and a dense pile of clay pipe fragments in another, further suggesting that the waste was taken from a variety of sources, and very possibly from various parts of the city.

The most frequent find types recovered from the moat:

Ceramics:	9,500+ sherds
Glass:	1,698 shards
Textiles:	1,397 fragments
Clay Pipes:	c. 1,186 fragments
Animal Bones:	c. 3,000

The figures above give an indication of the quantities of material and the relative frequency of various find types. In total, over 21,500 finds were registered from the moat fills. The post-medieval ceramic assemblage from Rådhuspladsen is the largest recovered from any Copenhagen site to date, weighing over 600 kg.

The rubbish

It is evident from the finds assemblage that the moat was filled up quite quickly, as the date range of finds (e.g. clay pipes, ceramics and coins) from the deepest backfill layers is similar to that found near the top.

Based on the evidence available, it appears that the moat was filled up sometime between the year 1675 and 1685. It appears that the embankment material was not used to fill the moat; presumably this was instead used to construct the new bastion. Consequently, the 5 m to 6 m deep of moat backfill comprised mainly of organic material: humic soil, timber, leather, bone, stable waste, and textiles.

The organic content had been extremely well preserved over the centuries in the damp environment, giving a wonderful opportunity to examine the whole spectrum of material types that were dumped there in the second half of the 1600s (Figure 147). The waste tells us little about the fortifications, but instead is a virtual time-capsule of everyday life in Copenhagen in the later 17th century.

Some of the more exotic finds recovered (for example porcelain and whale baleen) suggest trade with a wide range of distant places, in some cases indirectly, for example via bigger trade hubs such as Amsterdam. It was about this time that the East India companies were importing exotic items into Europe – the English and Dutch companies being particularly successful. The Christian IV supported Danish East India Company was less of a success, though it was also engaged with trade in the Indian Ocean at this time. Even in Copenhagen though, it is likely that the Dutch East India Company's influence was the greater and contributed to a growing wealthy merchant class, and an increasingly prosperous city.

Modern consumerism may have its origins in the early 20th century, but steps were already being taken in that direction in the 1600s. A growing number of wealthy people were buying consumer goods in ever increasing quantities. Of course, in an era that was pre-industrialisation and pre-mass production, true consumerism was not yet possible, but the increasing number of quite wealthy residents, rapidly acquiring new, sometimes exotic and ever less necessary products in increasingly large quantities, was a move towards modern consumerism.

The rubbish excavated at Rådhuspladsen was not placed in the moat with the aim of telling us today what the city was like in the 1600s, but rather to fill an unwanted hole in the ground and to simply get rid of rubbish. The upside of this is that it was done in a rather neutral way, with no thought for the possibility that anyone would later examine it. It was therefore 'normal' rubbish, which reflects the reality of society, the good and bad aspects, in a mostly unbiased way. There can be some bias of course – with some kinds of material perhaps being seen as inappropriate and dumped elsewhere, or not dumped at all. We are not seeing a full representation of life in Copenhagen in the 17th century, but rather a partial representation based on what was collected from the waste piles around the city and carted to the western boundary to fill a hole. The assemblage is partially a reminder of the actions of waste collection and dumping, and also a partial representation of life in the city.

Dining, Drinking and Smoking

The ceramic assemblage included Late Red Ware, Majolica (including pieces which had been repaired), Faience in numerous forms (mostly Dutch), Jydepotter (Jutlandish), German Stoneware (Westerwald, Frechen, Bartmann, Siegburg, Niedersachen), and the ceramics came in many forms; jugs, plates, lamps, pans, bowls, tankards, vases, ointment jars etc. Approximately two thirds of the pottery post-dated 1650. The imports were overwhelmingly from Germany and the Netherlands, the latter perhaps partially reflecting the large Dutch population in the city in the 17th century, as well as the influence of trade with

Amsterdam. There was also waste material recovered from pottery making, suggesting local production of pottery. The Rådhuspladsen assemblage has further shown that local production was more varied than previously attested.

The evidence shows that Dutch faience and Majolica came to Copenhagen in large quantities in the 17th century, whereas Italian faience was not very widespread. This tells us something about the main trade routes, and the dominant external influences. The ceramics mostly related to kitchen use, but also to the serving of food and drinks. Mass production was evident, and generally the ceramics were rather everyday in form.

The glass assemblage included bottles, window glass and drinking vessels for both beer and wine. Drinking vessels recovered included Humpen, and Passglas, Röhmer glass, green wine glasses, façon de Venice glass, Flügel, and bossed beakers, suggesting a well established drinking culture. The majority of the vessels were imported, though some Danish made material was also seen. One Venetian vase was recovered, and many fragments of round or bulbous bottles and square flasks. Some of the bottles had seals, and from these some very precise dates for the bottles can be established. These indicate dates in the 1660s, but also in the 1670s.

Overall the glass assemblage is what might be expected from a city site dating to the mid to late 17th century. An exception was the recovery of some 20 winged goblets or flügelglas, which were both exclusive and probably expensive items. The recovery of so many fragments suggests a good deal of these luxurious items were being used in the city. So there is an inclusion of unusual, rather luxurious items. It was apparent that much of the finer glass, though found in later 17th century layers, originated in the earlier part of the century. This suggests that the finer glass vessels were taken better care of, and lasted considerably longer.

The majority of the glass was imported from North Germany and the Netherlands, and the sheer quantity shows that it was both quite widely available and reasonably affordable. It is apparent that the drinking of beer and wine was common, and also that vases were being used in some homes, presumably for the keeping of flowers.

The cutlery found was in many cases quite elaborate with decorated handles and shows that it was important to have fashionable equipment for everyday functions. A number of two-pronged forks were recovered, showing that Copenhageners were up to date with the new trends across Europe at the time (these two-pronged forks were likely to have been used for serving food, only in Italy was it common to eat with a fork at this time). Knives and spoons were also found, in silver, copper alloy and pewter. Knife handles were mainly of bone, with some wooden handles also seen. One entire knife was carved from bone, and it is unclear if this was a functional item or in some way an ornament or toy (Fig 148). In general, the cutlery seems to be indicative of the wealthier classes. This shows that at least some of the waste was coming from wealthy households.

Figure 148 Bone carved knife

Wooden kitchen utensils such as plates and spoons were also found, as well as non-food related items such as candle holders, candle snuffers, scissors, and wooden brooms. The household cultural package seems to have been quite broad and diverse. A significant amount of stove tiles were recovered, and show the popularity of this means of heating.

Where food is concerned, the animal bones recovered from the moat backfills suggest that beef, sheep/goat and pig dominated the urban diet, in that order, followed by domestic fowl. Deer was almost absent, suggesting that this was not a meat available to most people.

Non-food related bone material was hardly seen at all, only a few horse, dog and cat bones were seen. So generally the bones of animals exploited for their meat or other by-products were dumped here, while pets and horses were given different treatment. These were probably dumped or buried elsewhere by the rakker (see above). The fish in the moat backfills were rather large in size. Many cod from 80-100 cm were observed, and vertebrae from large salmon/trout as well. Some vertebrae had been cut length-wise - probably as a result of making fillets from the fish, and points to the work of a practiced fishmonger.

The macro-botanical analysis of samples taken from the moat backfills, have revealed a range of dietary information. The samples contained a very high proportion of crops compared to other deposits on site, particularly barley as well as oat and rye. Plants such as hazelnut, cabbages and plums were also present. While the food and drink related waste can have originated anywhere in the city, it is interesting to note that nearby Vestergade was a street known for breweries and inns – eight breweries were located on this street in 1643. Situated to service those arriving into the city from the west, these may account for some of the dining and drinking related finds recovered.

Clay pipes of three main categories were retrieved, plain pipes which were the cheapest, those with stem decoration and makers marks which were the most frequent, and finally those that were polished or even glazed, which were very rare. These were the most expensive and show that smoking was a pastime for those in every walk of life. One personalised pipe with engraved initials suggests that smoking pipes could be treasured personal items. The pipes were generally Dutch in origin – it is unclear if pipes were being made in Copenhagen at this time.

Figure 149 Some of the many clay pipes recovered

Shoes, Clothing and Fashion

A huge amount of textile fragments were found, and were generally in excellent condition. Items recovered include wool, felted wool, silk, and velvet, and (where identifiable) items ranged from socks to ribbons, cuffs/garters, hairnets, hats, cardigans, trousers, blankets, gloves, jackets, and wigs (a growing trend in the 17th century). The majority of pieces were cut-offs and scraps, showing that a lot of reuse and reworking of clothing was going on. Previously only fine clothes of the nobility survived from the Danish Renaissance-era, and almost nothing of the ordinary people, so this assemblage will contribute greatly to knowledge of textiles from this period.

It looks as though some of the basic wool items were homemade, while some were made on a larger, but local scale, and were mainly the clothing of the poorer classes. The less frequent silk items were likely from a higher level of society. These showed less evidence for repair than the wool items. Something of the fashion trends can be seen, with, for example, balloon-shaped trousers and jackets of varying lengths popular for men. A lot of details regarding the weaves used can also be seen.

The leather and shoe assemblage was significant in scale. The majority of the shoes were very worn and were much repaired. Both well made and poorly made examples were seen, suggesting both the stratification of society, and variation in the skill levels of craftspeople. The shoes were seen to be inspired by the French and Dutch fashions of the time. It appears that the majority were made by shoemakers situated in Copenhagen.

As some of the finer shoes have clearly been worn out and then repaired a number of times, and sometimes quite badly, it suggests that the shoes of the wealthy might end up eventually being worn by less affluent people, whether that be through a process of re-sale, passing on of used goods, or even scavenging of litter.

Crafts and trade

Textile production items were seen, such as lace making tools, thimbles and bone needles. Other tools included a saw, an axe, a wedge, several chisels, awls, drill bits and a wooden pulley. It is difficult to be sure what kind of people owned these items, as it is likely that many people could sew, knit and perform practical tasks of this nature. Nonetheless it is likely that the tools recovered point to some of the craft specialisation that would have existed within the city by this time. This can be seen in some of the waste material recovered, such as the thousands of simple copper alloy pins, the hundreds of cut-off metatarsals recovered in a cluster, masses of wood chippings and the sizeable amount of slag found in the moat backfills. These kinds of by-products are indicative of workshops and specialist activities going on in the city.

One unusual find relating to a workplace was an intact ornate doctor's stamp. This was likely to have been an accidental loss, as it was certainly still functional when it was dumped.

Figure 150 Doctor's stamp

Some cloth seals were found, which are sometimes stamped with the name of their city of origin or even manufacturer. Some more exotic items were also recovered, such as an ivory handle. This object is likely to have originated in West Africa, and presents evidence of trade with some of Europe's colonial outposts of the time.

Some bridal parts, horse shoes and spurs were found. Some complete spurs found may have been lost initially, rather than being deliberately dumped, as these were clearly still functional (Figure 151). Perhaps some of the waste was brought directly from the streets and squares of the city, where such equipment might be lost.

As a busy harbour city, it stands to reason that a huge range of products, for example ceramics, glass, textiles, tobacco and a range of exotic goods, were being traded in and around the markets, stalls and streets of Copenhagen, perhaps in some cases before being moved on again. It is clear that the city's physical location, in a safe docking point close to the mouth of the Baltic, was key to its success, and to a very large degree has been responsible for the growth and prosperity the town.

Figure 151 Ornate spur

Discussion

So, what can this assemblage tell us of the people of the city in the 17th century, and of the process of deposition? Even the volume of rubbish that was available to be dumped in a short timespan tells us something – people were consuming at a level we do not see in Northern Europe until the 17th century, with vast quantities of products being made or imported, traded, used and ultimately disposed of – sometimes in a condition that suggests they were still useful. The evidence for smoking and drinking shows that a certain amount of money was available for non-essential activities, even among ordinary people. Conversely, shoes and clothes, even finer quality types, frequently showed repair, implying that it was acceptable for these to be recycled and reused, presumably by those of lesser means.

With shoes and clothing, signs of wear and tear and resulting repair are easy to identify. This evidence may suggest a bigger pattern of product movement - that many items were being reused and recycled. Perhaps fine glassware or once fashionable pottery might have been sold off, given away or discarded by the wealthy, only to become the property of the less well off, for whom it may still have been useful. These kinds of items are less likely to show obvious use-wear or signs that they have changed hands. The importation of foreign pottery, as well as the production of local imitations, is just one example that can be seen of an interest in having products that were fashionable in the wider northwest European region. This awareness of European trends was partially due to the extensive travel and trade conducted by Danish merchants, but also by their counterparts in Germany and the Netherlands in particular.

Also worth consideration is what was not found in the moat backfills. Just as the material that was dumped can tell us something of the people, so too can an analysis of what they did not throw away. For example metal plates and dishes are absent, yet must surely have been used by some. As with shoes, recycling may be the explanation – such items could easily be reused and reworked into new items, and so might not be

disposed of. The more recyclable certain object types were, the less likely they were to be dumped. As some still useful items were recovered in the moat backfills, it seems there was little opportunity for scavenging. Instead it seems that the rubbish was dumped quickly, before it could be gone through. It is even possible that people were not allowed to go through the waste, though such a ban would likely be difficult to enforce.

Within the assemblage it is sometimes clear that multiple objects fulfil the same function, but with different levels of ostentation. This can say something about the owner. But at Rådhuspladsen, we know that we are seeing this material as waste, dumped *en masse*, regardless of who owned it. We do not know if the more luxurious items came from wealthy homes, or had found their way in to the hands of those lower down the social ladder. If we found a selection of these items in the remains of a single homestead, we could tackle in a better way questions of what the assemblage meant; who owned it, what kind of people, and so on. Instead we must look at this collection of material as reflecting a broader group, a cross-section of Copenhagen society in the mid-17th century. We can begin to understand instead something about the city as an entity, about its place in the world, and about how its residents saw themselves.

To improve our understanding of the assemblage, we can use contemporary written sources. Inventories of the property of named Copenhageners in the late 17th century would be useful for this purpose. About 20 such lists survive from pre-1680, of which a selection have been studied and transcribed and found to contain evidence of both people of higher social strata and less well off people. The lists comprise records of everything in a household considered having value, thus including types of materials that for reasons of continual circulation or secondary use were not found in great numbers in the moat fills. On the other hand, items such as personal clothes are not always included and only rarely are objects like shoes mentioned in the lists, which indicates that these written sources cannot stand alone in an analysis of the material culture of Copenhageners of the time. While the inventories list what was considered valuable, the refuse in the moat mainly consisted of objects seen as having no further value. Hence, a full analysis of the surviving inventories in combination with the archaeological data has great potential to increase our knowledge regarding the material culture of the urban population.

Conclusion

The 17th century waste found in Copenhagen's former moat in 2012 has provided a wealth of evidence for the early growth of Copenhagen's modern consumerist society. There are still questions that remain unanswered of course, but a thorough investigation of the relevant documentary sources has the potential, in combination with further analysis of the assemblage, to cast much light on daily life in Denmark's capital in the 17th century. Nonetheless we have seen clear evidence in the assemblage of a growing city, and have gotten an insight into the life of its ordinary inhabitants and of their desire where possible to keep up with the fashionable urban populations of other cities in the wider region.

Archaeologists and specialists whose work was used in writing this paper:

Andersen, V, Dahlström H, Enghoff, I, Haggren, G, Ranheden, H, Kristensen, R. S, Lyne E, Pedersen, M, Rimstad, C, Whatley, S, Wiene, I

Rådhuspladsen – the contribution of natural science and finds analyses

During the excavation carried out at Rådhuspladsen, many thousands of finds were recovered from the various archaeological features encountered, and hundreds of samples were taken, mostly soil samples and timber samples. The finds which were taken in to the museum, were not only (in fact rarely) collected with a view to display, but rather, for the information that could be gained from the cultural material of the people that lived in the city in the past. Similarly, in various ways the samples taken can be analysed to shed new light on how the city developed, and was lived in in the past. Below, some of the methods used at Rådhuspladsen are briefly described.

The finds material

In general the finds collected at Rådhuspladsen tell us about the people who lived in the city in the past, what they used, what they needed, and what they wanted. It tells us something about the level of prosperity of the city, what kinds of food were being consumed, clothes being worn, and so on. At a broad level, analysis of the wider assemblage helps us to form a good picture of how it was to live in Copenhagen in the past.

Typology

Typological studies of find types allow us to examine how certain find types developed and changed through time. For example, was pottery generally handmade, or wheel thrown, was it glazed or unglazed, what temperature was it fired at, and when did these changes occur? Were shoes reused, or re-worked? Were they in line with fashion in the wider European area? The outcome of typological studies also means that when we find a number of finds together, by referring to knowledge of finds typologies, we can already be fairly sure of date-ranges of the layer or structure we are excavating, based on the finds associated with it.

Figure 152 Some sherds of early medieval Baltic Ware pottery from Rådhuspladsen

Distribution

In some cases the finds recovered during an excavation such as at Rådhuspladsen are recognizable as being imports. Clay pipes for example might have been made in the Netherlands. Mill stones might be of a type made in Germany or Sweden. This kind of information can tell us much about the trade networks in use at the time, and about what cities Copenhagen had contact with and exchanged goods with, directly or indirectly. Based on the studies carried out so far, the Netherlands, Germany, Sweden, Norway, France and the wider Baltic region all feature in Copenhagen's trade network to various degrees over the centuries when the city was growing.

Natural Science

When definable layers of soil from different features of the excavation such as pits, road surfaces or the moat were excavated, as well as documenting the kind of material (describing and photographing it) found, in many cases samples of the soil were taken, usually in 2 litre plastic containers. These samples can be used for an array of analyses. The majority of them, if prioritized by the archaeologists as being important, were sieved in a special way known as flotation, where the material has water passed through it in such a way as to allow material that will float to be collected, while the remainder is sieved through various sizes of mesh. This means that tiny objects such as charred or waterlogged seeds, pieces of charcoal and very small artefacts that might be missed during excavation, can be collected for study.

When seeds (which preserve well if charred or wet) are found, they can be identified under microscope by macro-botanical specialists, and as a result a picture can be gained of the kind of environment present at the time in question, or of what kind of plants were being utilized by people in the past, and hence what their diet may have contained, for example what kind of bread, beer, or fruit was consumed.

Special column samples were also taken in some cases, to be analysed for the pollen contained within them. This can again be used to help us understand the environment around the excavation area at certain times in the past, were there trees present, or grassland, what kind of vegetation dominated? As pollen is easily airborne however, this kind of analysis must be used with care or it can be misleading.

C14

C14 AMS (Accelerator Mass Spectrometry) dating, also known as radiocarbon dating is a method for determining the age of an object containing organic (carbon based) material by measuring the amount of the radioactive carbon 14 isotope remaining in the material. This isotope decays at a known rate, meaning that the age of a given material can be ascertained, within levels of certainty described in percentages. This method can be used effectively on many substances, such as timber, grains, or bone. Care has to be taken though, as to what kind of material is chosen for C14 dating. For example, a structure made of oak wood might be C14 dated, but the result would give the age of the actual piece of timber, which might have been 500 years old when it was cut and fashioned into a plank. For this reason, a single C14 date can be very misleading, and it is generally better to obtain a number of related C14 dates, which can then be compared and thereby a more accurate date range can be established. C14 AMS dating was used for some of the older material at Rådhuspladsen, mainly the early medieval remains, including human bone from the cemetery area, and various seeds found in pits and wells.

Dendrochronology

Dendrochronology is the science of dating wood based on recognized patterns of tree-ring growth. The rings vary from year to year in a particular region, depending on weather and other factors effecting the trees growth, and the resulting tree ring patterns can be examined from a given piece of timber (if it is large enough with enough rings visible), to find out when it was growing. This was particularly useful at Rådhuspladsen, for two reasons. The first was that many wooden structures were excavated, and were in good condition, so sampling for dendrochronological analysis was very possible. The second reason that this kind of dating was particularly useful at Rådhuspladsen, is due to a drawback in C14 dating, whereby material that is too young (after c. 1650) cannot be accurately dated using that method. Quite a lot of the structures from Rådhuspladsen date to around that time, making C14 an unsuitable dating method for the majority of the post-medieval material. Furthermore, dendrochronology can give more accurate results if the wood sample has sufficient rings. It can also potentially tell us precisely when a tree was felled, if we have the outermost part of the tree preserved in the sample. Structures at Rådhuspladsen such as the medieval bridge and the post-medieval mill were dated using dendrochronology, and very accurate date ranges were established.

Tool mark analysis

As many wooden structures survived in good condition at Rådhuspladsen, it was also possible to examine the techniques made to construct them, the types of joints shaped, and in many cases, marks on the wood revealed what kind of tools were used. The timber from Rådhuspladsen from the later period showed signs of having been sawn on a mill, while much axe work was apparent on the older timbers such as the medieval bridge. It was also apparent that quite often timbers were being reused, taken from one structure to be re-worked and used again. This suggests that timber was a fairly valuable commodity at times, and was not plentiful in the immediate surroundings.

Figure 153 Planks from the mill foundation, showing evidence of both mill-sawing, and axe-shaping

Conclusion

This is a brief summary of some of the methods used in order to gain the most information possible from an archaeological excavation such as at Rådhuspladsen. Understanding the material we find is only truly possible as a result of a team effort, involving not only archaeologists, but various scientists and specialists of different kinds. The account of the excavation found in the cultural historical report, or indeed in the full excavation report, takes into account the findings of all of these specialists, and uses their results to put the archaeological discoveries into their proper context.