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Essays in Honour of Ingvild Øye on her 70th Birthday

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After the Town Burned! Use and Reuse of Iron and Building Timber in a Medieval Town

During the Middle Ages, fires devastated Bergen time and again. Large fires that destroyed the whole town or parts of it are frequently mentioned in written sources, and in Bergen's underground, fire layers, i.e. black and red stripes of ash, charcoal, burnt buildings and 'things', are the physical evidence of catastrophes. For more than 100 years, archaeologists have used fire layers as markers of phases that ended, and new beginnings. The layers are convenient when keeping order in chronological frameworks that are so essential in research (Hansen 2005b).

For the inhabitants of Bergen, the fires were of course anything but convenient. The written evidence relates how *everybody* was summoned to fight the fires: kings, the king's men, townsfolk. The means of firefighting were few, and apart from those involving divine force, holy crosses and shrines, most of them are still used today: buckets of fresh- and seawater thrown on the fire, sails soaked with water to quench the flames, buildings torn down to prevent fire from spreading (Fig. 1). However, wooden towns burn quickly and the sources tell us the obvious; 'many a man who was earlier full-well off, went away poor' (Sverre's saga, translation by Helle 1998, 26).

Wood and iron are Norwegian raw materials that played an important part in domestic and overseas economy (e.g. Helle 1982, 276, 310-311; Larsen 2009, 193). However, even if medieval towns are often perceived as important consumers (e.g. Larsen 2009,



Figure 1. Leather bucket from the first half of the 13th century, the oldest of its kind known from Bergen (H: 29 cm, diameter: bottom 19 cm, top 26 cm, acc. no. BRMO/77426). Until modern days, such buckets have been used in connection with firefighting. (Photo S. Skare ©University Museum of Bergen).

197), domestic urban consumption of raw materials is still a rather unexplored theme with interesting potential. The present paper draws attention to urban use – and reuse – of timber and iron. The objective is not to conduct a comprehensive study of the issue, but rather to focus on urban consumption in the aftermath of catastrophic fires; *what happened after the town burned? And who was involved in activities at the fire site?* With a bottom up, humane scale approach (cf. Griffiths 2013; Hansen 2015) information on the context/find circumstances for building timber and artefacts of iron is studied. Aims are to get a glimpse of how and by whom the sudden scarcity of resources was handled in the days after the town burned and to show how a bottom up approach may offer new explanations to unexpected or puzzling trends in the archaeological sources. The study is concerned, first, with the use and reuse of building timber in medieval Bergen and, second, the scarcity of iron-objects from twelfth-century Bergen.

Bergen and the sources

Medieval Bergen was located on a morainic slope by Vågen, an inlet that stretches north-west to south-east inland from the inner coast of western Norway (Fig. 2). The first regulation of the town area most likely took place in the second quarter of the 11th century when plots were laid out. By the early twelfth century, a living urban community with settlement on most plots had emerged (Hansen 2005a) and throughout the Middle Ages, Bergen was an international centre of trade with today's Bryggen as an important merchant and harbour area. Settlement at Bryggen was, and still is, characterised by oblong plots with rows of wooden buildings that run from the Vågen waterfront towards today's Øvregaten, the medieval *Stretet*

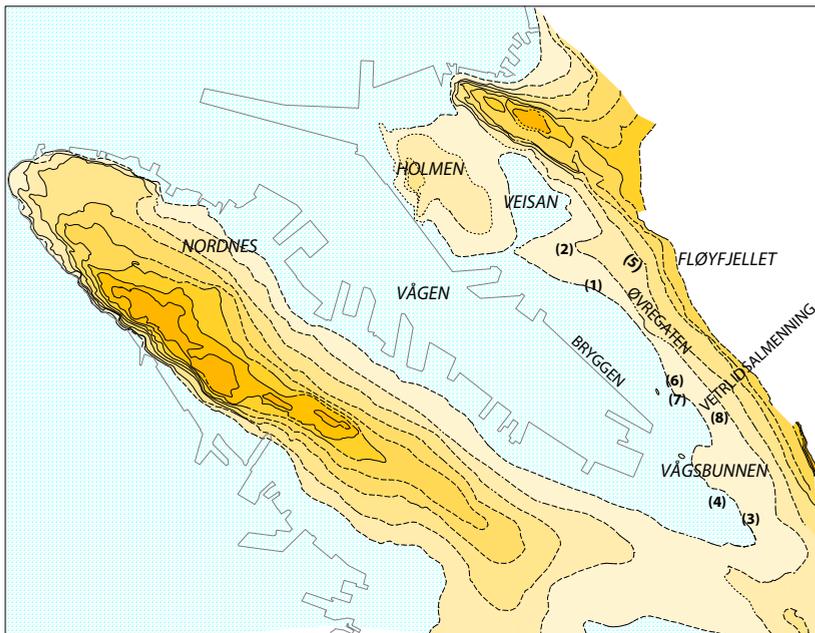


Figure 2. Bergen, topography AD 1000 and today's waterfront. Archaeological sites: (1) Bryggen BRM 0, (2) Dreggsalmenning 14-16 BRM 237, (3) Domkirkegaten 6 BRM 245, (4) Skostredet/Bankgaten BRM 346, (5) Øvregaten 39 BRM 94, (6) Finnegården 6a BRM 104, (7) Finnegården 3a BRM 110 and (8) Vetrlidsalmenningen BRM 342.

(The High Street). During the Middle Ages, this settlement expanded into the Vågen inlet as a consequence of the townspeople's pursuit of ever deeper water to accommodate ever larger ships. Thus, the harbour front is today located as much as 130 m from the original shore line and rests on multiple layers of wooden constructions and fill masses up to 11 m thick (Hansen 2005a, 55; Dunlop 2008, 9). Expansion of the built-up area into the sea often took place after a major fire. Archaeologically, a first large fire is dated to about 1120; later fires dating to 1170/71, 1198, 1248, 1332, 1413 and 1476 are well documented both through archaeology and written sources (Herteig 1990, 1991; Hansen 1998). For a comprehensive survey and discussion of Bergen fires in the written sources see Helle (1998, 22, 26).

Archaeology has a long tradition in Bergen and with more than 150 years of investigations in the underground, the sources are abundant. In 1955, in the wake of the large fire that burnt and destroyed 7,000 m² of the eighteenth century wharfs at Bryggen (Herteig 1969, 9), modern Norwegian medieval archaeology was born. Archaeological investigations on the fire site, *the Bryggen site* (BRM 0, inventory no University Museum of Bergen) and, eventually, in the other parts of the medieval town have produced a large body of archaeological material. Waterlogged conditions at most archaeological sites ensure good preservation conditions for organic materials; building timber is thus well preserved and traces of tool work and building technical details are still visible when the timbers are newly unearthed. Thanks to architect Egill Reimers' (1929-) lifelong engagement in the documentation of architectural finds from the Bryggen site, detailed drawings of timbers and a large number of timbers from this site are accessible for study at the University Museum of Bergen's archives and storerooms. Samples for dendrochronological analysis of building timbers have been taken of archaeological material through the years from 1955 onwards. Presently, more than 450 samples have been dated from the medieval town, they lend insight into the history of wood for building.

In comparison with organic materials, metals are generally less well preserved in the occasionally brackish/saltine culture layers. However, in the early phases of the town's history, the archaeological remains are located on 'dry land' on the moraine by Vågen, as opposed to the areas that were reclaimed from the sea in later phases. As regards the twelfth century iron objects under study here, preservation conditions are thus relatively good seen in a Bergen context. Some of the iron objects have been classified in connection with specialist studies of weaponry, tools for wood working, keys and locks and fishing tackle (Nøttveit 2000; Olsen 2004; Husvegg 2011; Reinsnos 2013). I have classified the remaining artefacts predating c. 1170 (for dating and classification principles see Hansen 2005a, 50-53). Original site documentation and information regarding the finds, the context of dendrochronology samples and site-dates are found in the University Museum of Bergen's archives.

Urban use of building timber and iron

Timber and iron must have been raw materials in demand in the medieval town. Concerning the need for wood, Bergen's secular settlement was almost exclusively built in timber; buildings, quay structures, drainage systems and many wells were thus made of wood, while roads as well as passage ways were most often paved with planks. We do not have estimates of how much wood Bergen would consume at given times during the Middle Ages; however, based on archaeological finds, Trygve Fett has estimated that 10,000 *mål* (1 *mål*=1000 m²) of woodland was required to supply the building timbers used about AD 1300 in the medieval town of Oslo in Eastern Norway. Oslo's secular settlement was also built almost entirely in

wood. Fett underlines that his estimate has many unknown factors and must be taken as a guide only (Fett 1989, 85-88). Still, even if the numbers cannot be applied directly to Bergen, they give an idea of the size of demand for timbers to satisfy the needs of a medieval town.

Regarding iron, we must assume that, for instance, iron tools for wood working were a necessity in a town where most structures were built in wood. Wood chips are a common ingredient in the urban culture layers and witness that wood was worked here in connection with construction. However, an in-depth study of the needs for iron, both in relation to the types of objects and the amount of raw material consumed in a medieval town, has not been made to date (but see Andersson et al. 2015). To get an idea of the scope of objects used in Bergen, I have made a compilation of iron object categories found in 12th century town and, in phases dating from the thirteenth-sixteenth centuries, at three archaeological sites located in three areas of the town. This gives some insight into the repertoire of iron artefacts found archaeologically in Bergen in the Middle Ages (for further details see Andersson et al. 2015). The three sites are *Dreggsalmenning 14-16* (BRM 237), *Domkirkegaten 6* (BRM 245) and *Skostredet/Bankgaten* (BRM 346) (Fig. 3).

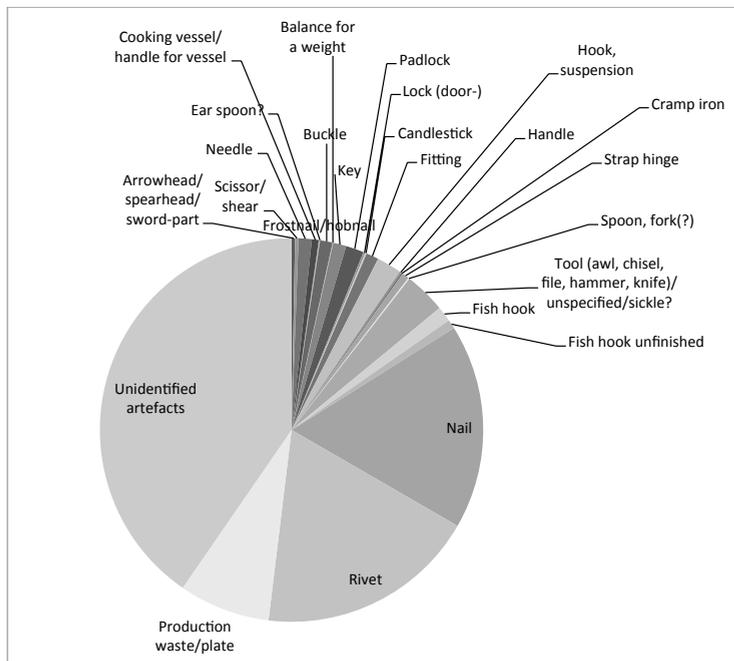


Figure 3. Compilation of iron artefact categories found in twelfth-century Bergen (1100-c. 1170), and in thirteenth-sixteenth-century phases at *Dreggsalmenning 14-16* BRM 237, *Domkirkegaten 6* BRM 245 and *Skostredet/Bankgaten* BRM 346 in Bergen. N=1717 likely iron artefacts. Categories of finds as a share (%) of the 1717 artefacts in the assemblage. (Data modified from Andersson et al. 2015, Bilaga 1).

The compilation shows finds associated with buildings and other structures, for example nails, cramp irons, fittings, strap hinges and door locks. Objects used inside buildings are represented by candlesticks. Utensils used in daily activities and industry are cooking vessels and handles/suspensions for vessels, knives, sewing needles, scissors and fish hooks. A balance for a weight is also among the finds. Tools are represented by hammers, chisels and awls as well as miscellaneous tools of unknown function. Among more personal accessories are keys, ear spoons, buckles, frost nails and some weapon parts. Rivets, some for boats, and miscellaneous

metal production waste are also among the finds. The compilation shows the proportion of object types in relation to each other. Small objects such as rivets and nails make up the largest part measured in number of objects, if we do not consider the category ‘unidentified artefacts’. The compilation also shows that the repertoire of iron objects found in Bergen is not particularly wide. Admittedly, a closer study of the iron objects – not least the ‘unidentified’ – would be very interesting for a more precise assessment of the scope of iron objects used. For the moment, however, it seems safe to assume even based on the rough data, that iron was a raw material used in many spheres of life in town.

After large fires, settlement was soon re-established in the town area; the sources show that building land was not left open, but filled with houses and infrastructure. Not least, the quay areas were built up again and in most cases new building land reclaimed from the Vågen bay was incorporated. Exactly how quickly the tenements were rebuilt – months or some years – we do not know in detail. Either way, when the town burned, there must have been an acute need for raw materials. In the following, we look into how this was handled, first regarding wood, then iron.

The need for building timber

Throughout the Middle Ages, fresh wood was acquired by the townspeople. It has already been argued that the town's needs were significant. Figure 4 shows the year wise distribution of the date of the youngest year ring in 451 dendrochronology dated timbers from archaeological sites predating the mid-fourteenth century in Bergen.¹ The number of timbers per year peaks around known fires: 1120s, 1170/71, 1198 and 1248. This illustrates that especially large amounts of fresh wood were acquired by townspeople in times after a fire, when tenements were going to be rebuilt.

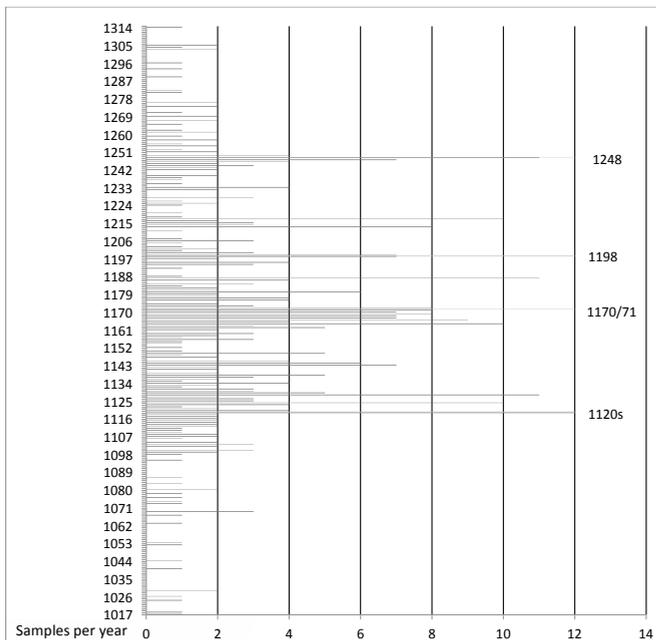


Figure 4. Fresh wood consumed in Bergen. Four hundred and fifty one dated dendrochronology samples from excavations in Bergen. The date of the youngest year ring preserved and the number of samples per year. Note that the amount of timbers peaks around the large fires in 1120s, 1170/71, 1198 and 1248 (fires marked in **bold**). (Data from Hansen & Reimers 2000).

However, not only fresh wood was used. Documentation drawings from the Bryggen site reveal the reuse of wood in the medieval town. A clear example is seen in timbers in a substructure built by the Vågen harbour-front shortly after the 1198 fire. Here, we identify details such as tongue and groove and holes for rivets that are clearly out of context in the foundation. They show secondary use of the wood (Fig. 5) (Hansen 1994, Ekskurs 1 fig. 2). Particularly informative cases of reuse are found in two quay foundations: caisson 92 and 100. These caissons were originally the lower parts of log-built buildings, and when found on the seabed of the Vågen bay, they were still intact with several courses of timber and door-openings (Fig. 6) (cf. Herteig 1990, 41-47).



Figure 5. Details of a substructure built by the Vågen harbour-front shortly after the 1198 fire. (After Hansen 1994, Ekskurs 1 Fig. 2).



Figure 6. Submarine house 1/ Caisson 92 at the Bryggen site (cf. Herteig 1990, 111; 1991, plate 10). (Photo: University Museum of Bergen).

Six logs from caisson 100 have been dated by dendrochronology, and we can reconstruct their life story in some detail. The oldest came from a tree felled in 1144, and the remaining five came from trees felled between 1180 and 1189, giving a 45-year age difference between the youngest and the oldest logs (Hansen 1998, tab. 4). Given that the date and context information on the oldest log is correct, this piece of building timber must first have survived the fire that struck in 1170/71. Then, after 1170/71, it must have been reused (or, less likely, stored for more than 18 years) before it was incorporated in the building that was constructed sometime after 1189. The lower part of this building survived the fire in 1198 with minor scorching, was recovered from the fire site and got its final place of rest as part of caisson 100/quay-substructure in the Bugården tenement shortly after the 1198 fire. The oldest log was consequently used in as many as four different constructions through its lifespan.

Not only timbers from buildings were reused; we also have many examples of recycled boat timbers (see Christensen 1985). To mention one particularly famous example, pieces of the boat known as ‘The big ship’ were retrieved in foundations for two different buildings in a tenement, also at the Bryggen site. The boat was built of wood felled in the winter of 1187/88 and was reused in the tenement foundations shortly after the fire in 1248. The timbers showed traces of scorching (Bartholin 2001; Hansen 2001). Perhaps the boat had been badly damaged by the 1248 fire and had to be scrapped?

The examples show how reuse of wood was practised in the town. To get an idea of the frequency of reuse we can turn to quantitative evidence given by dendrochronology. From the Bryggen site, about 400 wood samples have been dated. In phases younger than the last quarter of the twelfth century, almost all dated timbers came from trees felled decades earlier than the date of their stratigraphic find context would suggest. This shows that among the *dated* samples reused wood was the rule rather than the exception (Hansen 1994; 1998; 2001). To illustrate this point, Figure 7 shows dates for timbers found at the site in phases dating to immediately after great fires; only two of the timbers have a date that postdates immediately preceding fire and may thus represent fresh wood. The remaining timbers have dates that imply that they survived the preceding fire, and in some cases even several earlier fires as well. The high rate of reused wood among the Bryggen site samples, however, needs some explanation/balancing as it is not a direct reflection of consumption patterns for wood in Bergen; fresh wood was certainly supplied to the town as already shown. Due to strategies for dendrochronology sampling at the Bryggen site, the samples from this site are probably biased to favour reuse. During the excavations (1955-1979) dendrochronology was still at an

Period	Dated samples, youngest year-ring N=102
3.1: structures built after the 1170/71 fire	1115, 1120, 1135, 1137, 1146, 1146, 1149, 1151, 1174
4.1: structures built after the 1198 fire	1044, 1138, 1144, 1165, 1165, 1167, 1167, 1167, 1168, 1168, 1168, 1170, 1170, 1170, 1171, 1172, 1172, 1172, 1173, 1174, 1177, 1181, 1184, 1185, 1187, 1187, 1188, 1188, 1188, 1188, 1188, 1188, 1188
5.1: structures built after the 1248 fire	1083, 1114, 1124, 1128, 1144, 1147, 1148, 1161, 1170, 1170, 1170, 1178, 1181, 1182, 1183, 1185, 1188, 1188, 1188, 1188, 1193, 1195, 1195, 1198, 1198, 1199, 1199, 1200, 1201, 1214, 1214, 1215, 1215, 1232, 1247, 1248
6.1: structures built after the 1332 fire	1124, 1177, 1208, 1216, 1217, 1218, 1218, 1225, 1233, 1233, 1238, 1243, 1245, 1247, 1247, 1248, 1248, 1248, 1248, 1248, 1249, 1258, 1259, 1289

Figure 7. Dated dendrochronology samples from structures built in phases following large fires at the Bryggen site. Dates in bold are of fresh wood. (Data from Hansen & Reimers 2000).

early stage in Norway and sampling was carried out with the aim to collect sufficient wood for the establishment of a master dendrochronology curve for western Norway. The criterion for selecting timbers was that the log had many year rings preserved and the issue of reuse was not considered (Hansen 1998, 92). Thus, close to all the dated samples from the Bryggen site stem from foundations under buildings and quays; this was probably where the best preserved timbers were found during excavation (Hansen 1994, 140). It is unsurprising that there is an almost 100% frequency of reused wood in such constructions; here, bulk was the priority and materials that were no longer suitable in visible parts of the built up environment could still be of use.

To conclude, fresh wood was supplied to the town, especially after large fires, but the reuse of wood was very extensive and substructures were to a great extent built of reused materials that survived the fires.

Urban use of Iron

As mentioned, objects of iron are common in the archaeological collections from medieval Bergen. A study of the consumption of iron in medieval Bergen has, however, shown that in contexts dating to the 70-year long period between 1100 and 1170/71 (hereafter, *the twelfth century*), archaeology has only produced iron objects with the combined weight of 3.3 kg. Based on an estimate of the amount of iron found per m², only 2.2 kg would have been found on an average size town plot/household in culture layers accumulated through the 70 years covered by the study. And, ultimately, taking this measurement and our knowledge of the extent of the settlement/minimum number of plots in twelfth-century Bergen as a point of departure, archaeologists would only have found 82 kg of iron if the whole merchant and harbour area of the town had been excavated (for details in the calculation see Andersson et al. 2015). Compared with estimates on the need for iron in an Iron Age/medieval rural household, e.g. archaeologist Lars Erik Narmo's estimate amounting to one kilo per year per farm household (1997, 128; 1996; Larsen 2009) the low amount of iron found archaeologically in twelfth-century Bergen is puzzling. So how can it be explained?

How much Iron?

The study of iron consumption in twelfth-century Bergen was based on finds from archaeological contexts in the secular parts of the town area where ordinary people lived. None of the finds stem from the royal or ecclesiastic sites in the town. One hundred and seventy six objects of iron were identified and made up 1.9% of the twelfth-century assemblage. There are several reasons why the iron objects found archaeologically do not represent the full amount of iron raw material that was actually consumed during the twelfth century.

First, we have all the methodological reasons; archaeologists do not find 'everything', perhaps there is even the chance that rusty lumps of earth are more frequently overlooked than more easily identifiable objects. Indeed, in the early days of medieval archaeology, iron lumps may have not been considered as an artefact worthy to be collected. Preservation conditions for metals may also be an issue, which has already been mentioned briefly.

The twelfth-century iron artefacts are found at sites that were investigated between 1955 and 1992. During this period, archaeological field methods developed as regards strategies for collecting finds and it is timely to ask whether changing collection strategies may have

influenced the amount of iron collected from 1955 onwards. Finds from the Bryggen site make up by far the largest proportion of the twelfth-century assemblage of objects and it is interesting to see how metal finds are represented at this site compared with sites excavated at later dates by more finely meshed collection routines.

One hundred and fifty eight of the twelfth century iron objects stem from the Bryggen site and they make up 1.95% of all the finds here. The remaining 18 objects are from five excavations carried out between 1981 and 1992 (cf. Fig. 2) (Øvregaten 39 (BRM 94), *Finnegården 6a* (BRM 104), *Finnegården 3* (BRM 110), *Dreggsalmenning 14-16* (BRM 237) and *Vetrlidsalmenningen* (BRM 342)), they make up 1.42% of all the twelfth century finds here. Judged by these numbers, it seems that metal finds are represented by a larger share of the finds at the Bryggen site than at the five other sites.

The two *Finnegården* sites, which account for most of the finds from the five sites, were located *in* the salty water of the Vågen bay in the twelfth century phases. This may have reduced the share of iron objects preserved here, and in turn the overall share of iron objects at the five sites. The three other excavations were located on dry land and preservation conditions for iron should be comparable with those at the Bryggen site. All the five sites were excavated by very detailed methods. Therefore, if iron objects were there to be found they would probably not have escaped the archaeologists. All in all, it seems that iron objects are not particularly underrepresented at the Bryggen site in the twelfth century compared with other contemporary sites.

Many of the retrieved iron objects were actually more or less complete when deposited (Fig. 8). However, due to preservation conditions in the ground, they are somewhat corroded and the original weight is reduced. Even if most of the objects have undergone conservation treatment, they have not regained their original weight through this treatment. It is thus likely that the objects had a higher weight originally than when measured in the storerooms. Still, I think there is a more important reason why we find so little iron, namely that of reuse.

Considering the weight of the individual objects, only 10 weigh more than 50 g and only four objects weigh more than 100 g. In Fig. 9, the number of objects and object types found in Bergen (1100-1170/71) are presented.



Figure 8. Selection of iron objects from twelfth-century Bergen. Acc. nos. from left to right: key BRM 0/44749, arrow head BRM 0/85425, key BRM 0/72983, arrow head BRM 0/65010, strap hinge BRM 0/64782, key BRM 0/64902, spear head BRM 0/77157, scissors BRM 0/44653. (Photo: S. Skare ©University Museum of Bergen).

Object	Number
Balance arm?	1
Bolt?	2
Candlestick?	1
Cramp iron	2
Fitting/fitting?/fitting for a casket	7/4/1
Frostnail	1
Handle for a cooking vessel/handle for cooking vessel?	1/4
Hook/hook?	10/5
Key for padlock	7
Knife	2
Lock for a casket	1
Nail	40
Boat rivet/rivet?	18/4
Boat rivet/nail	5
Sicissor/shear	2
Sickle?	1
Spearhead	1
Strap hinge	5
Suspension	1
Tool/ tool (awl?)	4/2
Tool, ear spoon?	1
Unidentified/lump	38/3
Weapon: arrowhead for war/arrowhead for hunt/spearhead	1/1 1/1/1
Total number of artefacts	176

Figure 9. Iron objects in Bergen 1100–1170. (Data modified from Andersson et al. 2015, Bilag).

We see that no larger iron objects, such as axes for wood working, have been found. With the secular parts of town being built in wood, wood working must have been common and we would, as already mentioned, have expected to find axes as well as other larger wood working tools. An interesting observation is also that objects that come in pairs such as strap hinges for doors are only found one by one. The evidence suggests that when we find iron objects archaeologically, it is those that under various circumstances were lost/intentionally deposited and not retrieved/reclaimed by townspeople. Returning to the 82 kg of iron mentioned in the calculation initially, it must represent the amount of iron that went out of circulation, not the amount of iron that was actually consumed over the 70-year period in question. It is thus not directly comparable to e.g. estimates of rural iron consumption mentioned earlier that are based on the presumed needs of given populations in given areas at a given time.

The amount of iron that went out of circulation is still surprisingly small. Even if we multiply the 82 kg in the estimate several times with the taphonomic reasons for weight loss in mind, the estimate certainly leaves the impression that iron as a raw material must have been reused over and over again and thus highly valued. This is also indirectly witnessed by the fact that the vast majority of objects that have been retrieved archaeologically are of such little weight; even tiny scraps of iron must have been valued enough to be picked up for reuse. This is the case not only for the twelfth-century material, but also for the younger materials, as seen in the compilation above (cf. Fig. 3). Here, small, light objects such as rivets and nails make up the majority of finds.

Under what kind of circumstances were the iron objects deposited?

With the realisation that iron was so highly valued in the 12th century town, we may assume that iron objects were not 'thrown away' as garbage, so that when we find iron artefacts they represent valuable items that were somehow lost in the Middle Ages and not retrieved. In 47% of the 176 twelfth-century iron objects, the history of deposition reveals that they were lost during fire: 54 of the objects were found in fire layers, 23 were found *in situ* in buildings but under a fire layer (and thus consequently lost during fire) and five were found in masses scraped together and used as fill-masses in the foundation of a quay built shortly after the fire. It is thus well established that many things were lost due to fire. For the remaining 53% of the finds, the history of deposition is more complex or has not been sufficiently documented.

If we look closely at the iron objects, the history of deposition (found in the original site documentation) may hint at how some were lost. As seen in Fig. 9, as many as seven padlock keys were found in the culture layers dating to the twelfth century. The first key was found in the fire layer of 1170/71 in building 43 at the Bryggen site. Three additional keys were found in connection with this building, but exactly where is unclear. In the field documentation, there are two alternative descriptions of the find context; the three keys were either found 'under the fire layer and under the building', or 'under the fire layer and west of the building' (in the direction towards the harbour, when going from the house). If the first alternative is correct, we may ask whether the keys had been tucked away, hidden in a place only known by the owner, and not found after the fire. If the second alternative is accepted, we can imagine that the owner of the keys lost them during the fire when escaping the house and running for safety by the waterfront. The fifth key was found in the 1170/71 fire layer in building 196, also at the Bryggen site. The sixth key was found in the 1170/71 fire layer on the passage/thoroughfare of a property at the Bryggen site; perhaps similar stories as the first four keys can be told for these two keys? The last key was found at the Finnegården 6a site in masses scraped of the property after fire and used as in-fill in quay structures built after the fire.

We have seen that the reuse of timber was very common throughout the Middle Ages and that iron was scarce in the twelfth century finds, in all likelihood because of reuse. We can infer that especially in great fires wood and iron were lost or damaged and must have become scarce and especially sought after. Today, when catastrophe strikes, we read in the news about victims who come back to the ruins of their homes in search for things of sentimental- and other value. The archaeological sources suggest that medieval townspeople did the same.

What happens during a fire?

Fire is nourished by oxygen, and when oxygen is no longer present, the fire dies out. So, when for instance the upper floor or roof of a building falls down, fire in the lower parts of the building may be smothered leaving the lower lying strata of building materials and objects unharmed, or at least not completely charred. Archaeologist Ann Christensson studied the archaeological remains of fires documented during excavation of the Finnegården 6a site in the southern part of today's Bryggen. Her pyro-technical analyses showed that in several cases, the lower parts of structures such as foundations, pavements, eavesdrops and drains were essentially left unburned after great fires had swept over this area. Christensson also observed that the fire layers themselves, which if *in situ* would be characterised as layers of ashes and charcoal with an internal laminated layer structure, were often not found intact. In some cases, they had been stirred around, and in other cases they had been scraped away and scorched timbers were the only evidence of fire (Christensson 1988, chap. 4.3). We here have clear evidence that people went back to fire sites, moved around the ashes and searched through the ruins.

Who went back to the site of fire?

In the Sturlunga saga, we learn that the king summoned his men and townspeople. Apparently he even engaged himself in firefighting (Helle 1998, 32). However, who went back to the fire site in the days after the fire? We have some indications that the clearance of the fire site as well as the preparation for new settlement and rebuilding of the tenement was carried out individually, each property on its own. The fact that by the Vågen waterfront, today's Bryggen, boundaries have been upheld between tenements from the eleventh century till today shows that such boundaries were considered fundamental. They must have been identified and marked up immediately after a fire, to make sure that they were not built-over or trespassed. Another hint as to individuality is given in a study of conjoining artefacts, i.e. fragments of, for example, ceramic- or stone vessels that have been found in different contexts and could be pieced together. The study showed that neither 'rubbish' nor other kinds of discarded remains were spread across boundaries of the properties that had burned (Hansen 2005a, 48-50, fig. 6). This confirms that boundaries were strictly upheld and may also indicate that rubbish was considered not only as a nuisance, but also as an asset (as landfill) not to be shared with neighbours. Dendrochronological dates of individual structures built on properties in the twelfth century show that even if tenements were often constructed in the same style or fashion, the structures were built independently and often years apart (Fig. 10). Similar observations are made on structures from younger periods until the mid-thirteenth century (Herteig 1969, 79-80). This altogether suggests that it was not a 'common or public' enterprise neither to build nor re-build the town. An exception to this is documented for the first time in the beginning of the thirteenth century, when a 54 m wide quay structure was built along the waterfront across several tenements after the fire in 1198 at the Bryggen site (Herteig 1969, 80, photo 24).

We must imagine that owners, and for the later parts of the Middle Ages, renters (Erslund 2011) of properties on the town's plots came back as soon as possible to retrieve belongings and perhaps also to secure the ruins from looting. If we want to be more specific, the archaeological

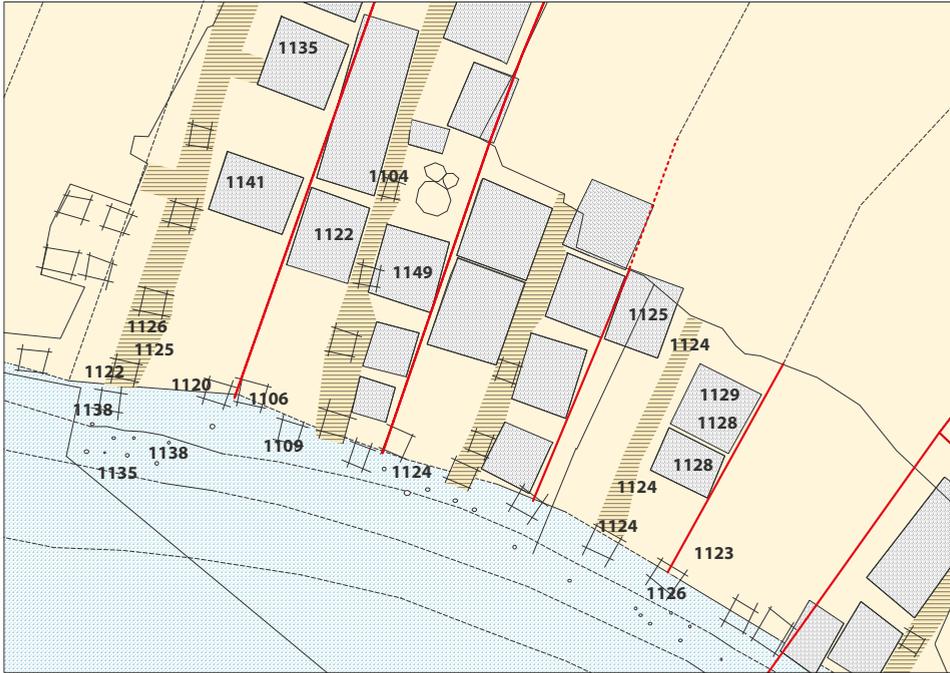


Figure 10. Dendrochronological dates of individual structures built on properties in the twelfth century. The solid lines are plot boundaries, the hatched areas are passages and the rectangular areas are buildings. (Data from Hansen 2005a, Appendix 2).

sources studied here hint at the identity of some of the people who worked *hands on* at the fire site. From the finds, we can make tentative deductions about their competence as well as of their lack of competence.

It is likely that those who went back to a tenement were residents there, at least they knew the layout and to a certain extent the contents of the buildings well; they knew where heavy tools were stored, hence the lack of axes and other larger tools among the archaeological iron finds from the twelfth century (cf. Fig. 9) (today axes are actually important tools used when firefighting, so maybe they were taken into use during fire and thus removed). They knew where doors with iron hinges and locks were located; so we only find the occasional door lock and hinge, and the latter never in pairs. They could also sort out usable timbers from wood that was no longer usable in construction and thus could be passed on to fill masses in foundations or as fire wood. This implies that they had skills regarding timber work. The sources also hint at what they did not know – did they perhaps not know where the casket with valuables was stored, and did they not know where to find the key for the casket? The fitting for a casket, the casket lock and the seven push keys for padlocks/barrel locks in the twelfth century assemblage may suggest this: perhaps they were neither owners of valuables nor of the tenement, but rather ‘staff’/people lower in the hierarchy. The two 12th century arrowheads and a spearhead may indicate that they did not possess such weaponry, even if the

arrow heads are so small that they could have remained unnoticed during search through the ruins. We also gather that they did not know where to find the scissors/shears, and handles for cooking vessels were also overlooked, thus the two scissors/shears and the handles for cooking vessels in the 12th century assemblage. Perhaps the people who looked through the fire site were not well acquainted with the kitchen or spheres where scissors were used (for instance, in connection with cooking, sewing and taking care of textiles?), so perhaps they were *not* women?

The owner of the tenements or at least persons with authority and rank to make large economic decisions must also have been present and engaged. It was, as we have seen, necessary to acquire fresh timber. It may also have been necessary to buy adequate second hand timber. The latter is indicated in the many finds of reused timber from ships recovered in tenement foundations. Perhaps some of the boats, such as the great merchant ship 'The Big Ship', that was mentioned above, already belonged to the owner of the tenement where it ended up in foundations of two buildings? Otherwise, the owner of the tenement must have been quick and bought up the remains of the boat after the fire of 1248.

Final remarks

The bottom up approach has offered human scale explanations to unexpected and puzzling patterns and trends in the archaeological sources. The approach has also provided thought provoking glimpses into town-life after devastating fires. In the Middle Ages, people apparently went back to the sites of fire in search for belongings and valuable materials, just as we do today when struck by catastrophes. It has been rendered probable that the search for valuables was carried out by men that, albeit of lower rank, may have belonged to the tenement/extended household. People with authority to make economic decisions, and thus of higher rank, were also involved. The study, however, is not only concerned with glimpses into the daily life of ordinary people, it is also about the issue of urban consumption patterns regarding Norwegian outfield resources. Attention has thus been drawn to the fact that reuse of timber and iron was significant in this urban setting. This must be taken into consideration in future discussions on towns and consumption.

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Endnote

1 Since the dates represent the youngest tree-ring preserved and not necessarily the felling year, it cannot be excluded that some of the timbers are slightly younger than their dendrochronological date. I consider this a minor problem since we are dealing with a large dataset. Regarding the issue of representativity, more than 1,500 pieces of timber have been sampled for dendrochronology in Bergen through the years, but only some 450 have been dated successfully (Hansen & Reimers 2000). Which timbers could be dated seems to have been random/determined by factors independent of the stratigraphic context (cf. Thun & Hafsten 1990, 135) The selection of timbers in figure 4 thus seems to be random and the peaks for the number of dated samples should thus be quite representative for when particularly large or small amounts of fresh wood was brought to town.