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The Hinterland Connection: Metalworking as Entangled Social Practice

For many years and in many articles, archaeologist Ingvild Øye has discussed the relations between medieval urban centres and the agrarian hinterland in Norway. A recurrent topic has been the extent of farming and livestock within urban economic practice, which has led Øye to highly interesting reflections concerning the symbiotic relationship between Norwegian medieval urban communities and their agrarian hinterlands (e.g. Øye 1998, 66-67). Inspired by Øye's work, I briefly present some tangible changes in medieval urban metalworking in Trondheim (Central Norway) and Tønsberg (Southern Norway) in terms of the use of raw materials, spatial organization, and mass production. Thereafter, I discuss the relationships between urban communities and their hinterlands as entangled social practices.

The commercialization of urban hinterlands

As a point of departure, I take archaeologist Richard Holt's rather controversial account of the degree of commercialization of the Norwegian urban hinterland in the Middle Ages (Holt 2009, 231-246). Typical of West European urban centres were the commercialization of the urban hinterland, which in Holt's opinion is crucial '*to understand the economic and social processes leading to and sustaining urbanization*' (Holt 2009, 239). Holt strongly argues for an understanding of Norwegian towns as having been of little economic importance to their hinterland. In his opinion, the way in which the urban economic and productive activities were mainly directed towards consumption '*within the towns, and often for household use rather than for sale*' (Holt 2009, 240) was a significant characteristic of Norwegian medieval towns, as for Norwegian medieval urbanization in general. Historian Knut Helle opposes this view as exaggerated, although he admits that there are obvious differences between the Norwegian urban centres and other West European market towns in the High Middle Ages regarding economic interaction between the urban centres and their hinterlands (Helle 2009, 251-252). Some conspicuous observations of the development of metalworking in the medieval town of Trondheim, which corresponded with a coincidental new development in iron extraction techniques and organization in the town's hinterland, may hopefully shed some light on this matter and thus contribute to a deeper discussion about the relationships between towns and their hinterlands in medieval Norway and their economic premises.

From emporia to town

The Late Iron Age/early medieval period was one of rapid social, economic, and political change within the Scandinavian territory. The leading political unit was the Danish kingdom. Its expansive attitudes towards the territories north of the Skagerrak and Kattegat, which were rich in desirable natural resources such as iron, stone, furs, and antler, was presumably a factor of major importance and initialized the early state formation process in what gradually came the Norwegian territory. In short, this led eventually to a territorial gathering of the coastal landscape bordering the North Sea and its mountainous hinterland, which later became known as Norway. Within this large territory, local chieftains allied themselves to the kings as loyal subjects, through whom the king could exercise regal authority when he not was present in the area.

An important element in the Late Iron Age and early medieval Scandinavian state formation process was the development of a new type of urban nuclei, which emerged throughout Scandinavia in the second half of the 10th century, first appearing in politically and economically strategic regions. These new urban nuclei differed from what the English archaeologist Richard Hodges (1982, 50-52) has classified as 'B emporia', such as Hedeby, Ribe (II), Birka, and Kaupang, according to the way they were spatially and temporally permanent and consolidated economic, political, religious, and administrative centres, while the earlier emporia were highly specialized trade and craft centres that had all disappeared before AD 1050 (Stylegard 2009, 71).

Dagfinn Skre has reclassified the B emporia as 'towns' characterized by a permanent settlement located in border areas and carriers of long-distance, inter-regional and regional trade (Skre 2008, 338 and Fig. 9.1). Holt argues strongly against this, what he describes as '*a note of confusion that most historians and archaeologists working on the early Middle Ages have tried to avoid*' (Holt 2009, 234-235), pointing to the fact that towns '*arose out of very different social and political conditions*', which he refers to as the emergence of early Middle Ages feudal kingdoms and the rise of a dependent aristocracy. A similar understanding is expressed by Brendalmo and Molaug (in press). Also Søren Sindbæk has stated a similar comprehension in as much as he introduces the concept of 'nodal points', and particularly calls attention to the archaeological localities of Ribe, Kaupang, Birka, Åhus, Truso, Gross Strömkendorf, and Hedeby (Sindbæk 2007, 121), and emphasizes that '*Some early Viking Age nodal points had an urban character not unlike the fortified towns from the tenth century onwards; but they were actors in a network of essentially different nature*' (Sindbæk 2007, 129).

In these truly impervious problems of definition and classification, I tend to follow Helle (2009, 248), who wisely suggests that the urbanization process should be perceived as a wide and open-ended process, allowing a multitude of different 'place types' (Norw. *stedstype*) to be involved. Regarding this as a significant premise for the understanding of urbanization in a long time perspective, the rise of a new type of urban communities in Norway from the last half of the 10th century can in short be characterized by administrative centralization, economic specialization, and concentrated political, legal, and religious power. These centres distinguished themselves from the (mostly) non-monetary rural surrounding areas by gradually evolving a specialized commercial and productive activity. In the following discussion, I concentrate on Trondheim and its surroundings as an example location of a

striking development in metalwork production and how this productive activity seems to have interacted with its hinterland and beyond from its early stage of urban development around AD 1000 to the beginning of the late medieval period around AD 1350.

Early urban ironworking in medieval Trondheim and Tønsberg: the use of gold, silver, and copper alloy AD 950–1150

The early Christian kings of Norway, Olav Trygvasson and Olav the Holy Haraldsson, seem to have played a decisive role in the establishment of the urban centre of Trondheim in the second half of the 10th century. Trondheim was strategically located at the mouth of Nidelven (the river Nid) and controlled the seaways to and from the rich region of the inner Trøndelag region. Trondheim evolved rapidly in the 11th and 12th centuries to become Norway's most important political and religious centre. There was a king's palace in the town from the very beginning, which was frequently visited by the king, and around AD 1150 Trondheim became the archbishopric of Norway. Against this background, we have to take into account the possible existence of a strong aristocratic element in the social structure which probably influenced on the development of metalworking in Trondheim during the medieval period.



Figure 1. *The Library and Flour magazine Site*

I will return to these questions of historical context after having taken a closer look at the archaeological remains of metalworking within the urban centre. The conditions for studying this subject are very good in Trondheim, partly because substantial remains from this activity has been uncovered through archaeological excavations located both in the centre and periphery of the urban area, and partly because the material has been subjected to scientific analysis and publication. I concentrate on the material from two of the most important excavation sites. The first site is the 'Library Site' (Folkebibliotekstomta), situated in the oldest and most central part of the medieval town, close to the river, and excavated between 1973 and 1985 (Christophersen and Nordeide 1994). The second site is the 'Flour Magazine Site' (Mellageret), on the outskirts of the town, which was excavated in 1987 (Espelund et al. 1989). The two sites are very different in terms of their location, but first and foremost in the way metalworking was carried out there. Let us take a closer look at these two sites (Fig. 1).

Within an area of c. 3,500 m² 12-14 densely built properties were uncovered at the Library Site, dating from between the end of the 10th century and the Great Plague in 1350, when the area temporarily was abandoned. One of the Trondheim's main streets, known as 'The Merchants Street' (*Kaupmannastrete*) crossed through the area. Metalworking remains were traced within some of the rectangular properties facing the street, including crucibles, casting moulds in clay and stone, tools, and raw, semi-finished, and waste materials, as well as workshop areas containing tiny traces of small furnaces (Bergquist 1989). These remains are decisive for characterizing the type and extent of the early metalworking activities in Trondheim. The crucibles may be divided into three broad groups according to their capacity, ranging from 5 ml to 100 ml.

X-ray fluorescence, X-ray diffraction, and Atomic Absorption Spectroscopy (AAS) were used to analyse samples taken from both the external and internal surfaces of the crucibles, and the results showed that the most common metals melted in them were copper, zinc, lead, and silver, and even some gold; no traces of pewter were found. The casting moulds were typically made of clay. The remains are very fragmentary, which makes it difficult to determine what objects were moulded within them, but small crosses, dress pins, brooches, and various objects for decoration were frequent finds (Fig. 2). Very few tools were found and only a crucible tong, pincers, plates with holes in different sizes for wire drawing, and a tuyère were represented among the finds (Fig. 3). Raw materials, debris, and semi-finished products are typical of the remains associated with the workshop areas within the plots. The most common types of ingots found at the site are small and made of silver, copper, copper alloy, or lead. A casting mould of same shape and size as the ingots was found within the same workshop areas (Fig. 4). Slag was found only in small amounts, not more than 67 kg in total. Of this, 30 kg include 'furnace bottoms', pointing at smithing as a very limited part of the total productive activity within the same workshop areas. A sample taken from one of the furnace bottoms was found to consist mainly of fayalite. This could indicate smithing activity, but also welding, according to metallurgist Arne Espelund (Espelund cited in Espelund et al. 1989, 118).

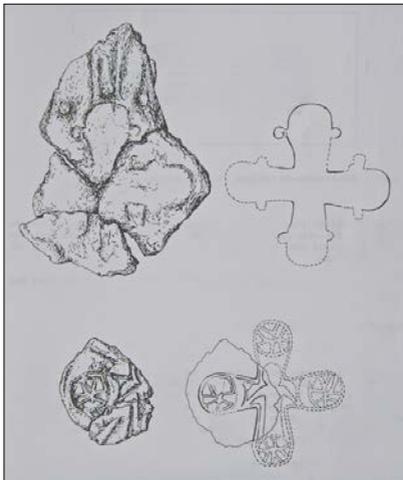


Figure 2. Moulds for casting small crosses, AD 1075-1125. Library Site. (Drawing: Runi Langum. After Bergquist 1989, Fig. 43)

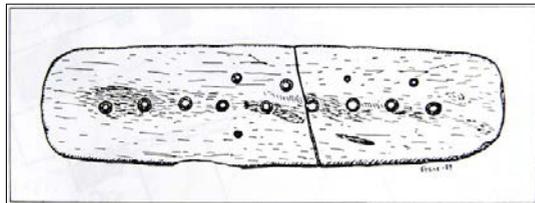


Figure 3. A tool for making thread, AD 1025-1075. Library Site. (Drawing: Anne Gaarden. After Bergquist 1989, Fig. 28)

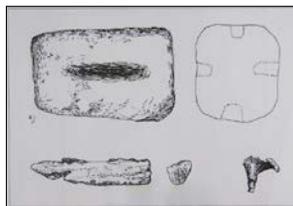


Figure 4. A mould for casting ingots. Library Site. AD 1075-1125. (Drawing: Runi Langum. After Bergquist 1989, Fig. 40)

The above short overview testifies that both casting and smithing were carried out at the Library Site between late AD 950 and AD 1150-1200, but that casting was by far the most frequent activity. The metalworking activity at that time was characterized by the production of various small decorative objects, such as different types of brooches, dress pins and Christian crosses in silver and copper alloys. The repertoire of techniques included gilding, engraving, filigree metalwork, and sheet metalwork. Against this empirical background it is attempting to classify the early metalwork in Trondheim as principally concerning the production of luxury goods (Bergquist 1989, 121). Another significant aspect of the early metalworking at the Library Site is that it was carried out temporarily, in the open air, and on a small scale. Bergquist has therefore anticipated that the local metalworking from the late AD 900s to around AD 1075-1100 was carried out as an itinerant and possibly seasonal activity (Bergquist 1989, 120-121). It has been suggested that the remains of early metalworking at the Library Site should be analysed and explained within the context of luxury production, covering the social needs of an elite, probably related to the king and his household and/or to local magnates (Nordeide cited in Christophersen and Nordeide 1994 239-241). Bergquist points alternatively (or additionally) to the fact that in the period AD 1075-1125 the production of small crosses and crucifixes was intended for the Church and the growing numbers of pilgrims (Bergquist 1989, 120).

Changes in ironwork AD 1100 to 1350 – from casting to smithing

During the first half of the 12th century, the picture changed in terms of produced items, the volume of production, and the way the production was organized. Smithing seemed gradually to be more frequent, and from about AD 1125, it seems to have become the dominant metalworking activity at the Library Site, working on a range of properties along the main street (Bergquist 1989, 121). A dramatic change happened when a large production area around AD 1150 was established at the outskirts of the town, close to the mouth of Nidelven. A minor part of this area was excavated in 1987 and revealed that intensive metalworking had taken place within a large, structured, industrialized environment. The remains of a plurality of workshops constructed of wood were uncovered, each of which was a nucleus within a composite whole, together with hearths, various forms of pits, and large amounts of slag and other types of debris covering an area of c. 1,250 m² (Fig. 5). The main activity seems to have been iron smithing, but also some copper smithing (Espelund 1989, 215).



Figure 5. A reconstruction of the workshop area. The Flour Magazine Site. (Drawing: Karin Støren Binns)

The type and size of the industrial area at the Library Site is quite unique among Scandinavian medieval towns and has not yet been fully analysed. Therefore, we do not understand the precise nature and size of the production activities, the organization, and the socio-economic context. However, some preliminary thoughts have been presented. One possibility is that the area reflects some impulse of self-organization among the metalworkers themselves (McLees 1989, 245). Another debated theory is that the activity was initiated, controlled, and organized by Archbishop Øystein, who in AD 1152 became the first archbishop of Norway.

There is a significant coincidence in the change from the sporadic casting of luxury items in gold, silver, and copper alloy by itinerant craftsmen on the plots in the centre of Trondheim and the establishment of an extensive production area in the town's periphery, where continuous, well-organized, large-scale smithing in iron and copper took place from the mid-12th century onwards. At this stage, the metalworking did not totally disappear from the central part of the town, but it was dramatically reduced both in size and complexity: after AD 1150, casting in gold, silver, and other noble metals was no longer carried out at the Library Site and only very little smithing was done there (Bergquist 1989, 122). In itself this indicates a substantial change in the social and economic context within which both casting and smithing took place around AD 1150. However, metalwork from other places within the urban centre of Trondheim does not indicate such a distinct spatial reallocation of metalworking, nor does it indicate a dramatic reduction in casting for smithing purposes. On a site relatively close to the Library Site, substantial remains of cast copper alloys and industrial structures, such as hearths or furnaces occurred in layers dated to AD 1150-1250. Further, on a peripheral site to the earliest urban settlement, hearths and furnace bottoms were embedded in layers dating from the 11th century, indicating very early smithing activity. This rather complicated picture calls for a closer look at the physical remains of metalworking from another Norwegian medieval town, namely Tønsberg in Southern Norway. Archaeologists Jan Brendalsmo (1986) and especially Sigmund Jakobsen (1991) have elaborated on the metalworking remains from the town's medieval stratigraphy.

Ironworking in medieval Tønsberg: a matter of local demand?

Tønsberg probably developed from a regional Iron Age trading place to an urban centre during the 11th century (Brendalsmo and Molaug in press). Large excavations were carried out in the town in the 1970s and 1980s and revealed evidence of metalworking in the northern periphery of the town from about AD 1150. The material has been analysed and published by Sigmund Jakobsen (1991). Jakobsen has primarily studied technical and functional aspects of the metal products and their production processes in order to answer questions about what was produced, the quality of the products, the skills level of the craftsmen, and for whom the craftsmen worked. In brief, he has drawn the following conclusions: (1) slag, furnaces, tools, raw materials, semi-finished products, and finished products show that smithing was the dominant activity, although casting in silver, copper, and copper alloys was also practised to a limited extent; (2) the level of technical knowledge and skill was high, and the craftsmen were able to produce high quality tools; (3) there were no traces of 'mass production'.

Accordingly, Jakobsen suggests that the smithing activities in Tønsberg in the High Middle Ages were determined by the social needs of the town's upper class, who also ruled big estates

in surrounding the countryside. This conclusion can be modified in other directions than proposed by Jakobsen. One important point emphasized by Jakobsen is the high quality of the products, which in his opinion does not correspond with mass production for an anonymous market. Although this may be correct in principal, he has no comparative material to support his suggestion. Only a few objects give an impression of an aristocratic lifestyle. For example, analyses revealed that few objects were strictly associated with the martial commitments of the king's men. In general, the published material comprises first and foremost common items, such as knives, scissors, locks, and nails, all of which are objects that would have been used in everyday life within and outside the town. It is significant that traces of casting in noble metals, such as gold and silver, and finish products are rarely found from this period in Tønsberg. This rather indicates that metalworking from AD 1150 was primarily governed by the population's demand for items for consumption.

Changes in metalworking in Trondheim and its hinterland

Some main trends in the development of the medieval urban metalworking can be suggested, bearing in mind that the general picture is diverse, thus allowing for both regional and intra-urban deviations.

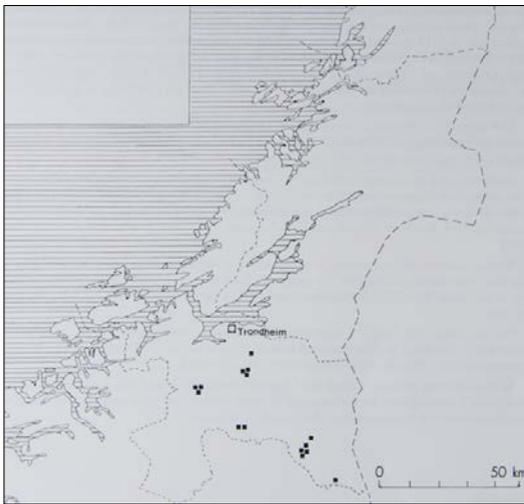
Based on material from Trondheim and Tønsberg, a distinct feature in the early urban metalworking in Norway is the production of a small-scale luxury goods production, giving priority to the development of casting and advanced tooling methods involving noble metals such as gold and silver, as well as brass. Itinerant and skilled craftsmen probably carried out this production periodically and on a small scale. It is suggested by Nordeide (Nordeide cited in Christophersen and Nordeide 1994, 237) that they probably were attached to regional landowning aristocracy, which may have provided the craftsmen with the necessary raw materials. During the first half of the 12th century, this picture gradually changed in a direction indicating the emergence of mass-produced metalwork. Smithing seemingly became the dominant activity, taking form of consumption production guided by the daily need of the urban populations and probably also the rural populations surrounding the urban centres. The production of prestige items did not disappear, but it is less visible in the archaeological sources after AD 1150-1200. At least, from the limited use of archaeological sources underpinning this study, it is quite difficult to outline the further development of specialized urban goldsmithing and silversmithing. Thus, the picture of a consumption production is confirmed by the facts that the smithing activities (1) were more stable and attached to one locality (a workshop) than in the 11th and early 12th centuries, (2) became better organized, (3) increased the production levels, and (4) developed a high degree of specialization. The established industrial-like metalworking area in Trondheim is a significant and unique feature, expressing the general development outlined above.

The relationships between the town and the surrounding rural districts were affected by this development, first and foremost because the hinterland became more integrated in and dependent on the town's economic life. Items that earlier had been produced in rural areas within the context of home crafts, were now probably to a large extent produced by professional craftsmen in the towns. The development of a powerful landowning aristocracy gave way to increased exploitation of both labour power and natural resources. The surplus from food production and exploitation of valuable natural resources (such as iron and furs), was gathered in the town centres for refining and export. The monetization of the Western Scandinavian

territory during the 11th and 12th centuries accelerated this process, and this moderates Holt's assumptions that the urban hinterland in medieval Norway was not commercialized, or was only commercialized to a slight degree.

Archaeologist Lars Stenvik describes how the iron production in Central Norway increased between AD 1000 and AD 1200 with a peak around AD 1150 (Stenvik 1997, 261 and Fig. 4), and suggests that this might have affected the urban community of medieval Trondheim. Stenvik calls this period '*the second iron-boom in Trøndelag*', and makes a connection between this boom and an '*increased consumption in the city of Trondheim*' (Stenvik 1997, 261-262). This might well have been the case, taking into account the arguments raised by Jakobsen based on evidence from Tønsberg, but it also raises new and intriguing questions: What had increased consumption? Was it iron blooms to be worked into bar iron or possibly finished products? Was it for local household consumption or was it for regional and/or international trade? Moreover, what were the economic, social, and cultural consequences of the increased production and consumption?

The Flour Magazine Site between AD 1150 and AD 1350 may cast some light over the answers to these questions, and therefore I include a short summary of selected, relevant findings from the site. The total production of iron must have been enormous, since a slag-bearing layer that was c. 1 m thick and covered an area totalling 400 m² covered most of the total production area of c. 1.250 m². The area in question is described as '*an extensive area of intensive metalworking activities taking place within a large, structured industrialized environment, each workshop being a nucleus within a composite hole*' (McLees 1989, 238). The production activities were carried out within small, aligned wooden workshops with vertical plank-built walls, earth and/or clay floors, and equipped with hearths and/or furnaces, some of which might have had clay superstructures and provision for the placement of bellows. The production activities were complex, but three main production lines seems to have been (1) iron blooms brought in from the hinterland of Trondheim and worked into bar iron, (2) black copper cast into ingots, and (3) fusing of copper and lead (and possibly also silver and tin) that was worked into pure metal or cast into ingots.



The size of the production area and slag warp, the complexity of production activities, the level of physical organization, and the isolated location in itself separates the metalworking complex at the Flour Magazine Site in all respects from the earlier metalworking activities and even contemporary metalworking activities carried out on various plots along the main street, Kaupmannastrete, in the centre of Trondheim. As Stenvik (1997) has

Figure 6. The distribution of 14C-dated iron production sites in Mid-Norway from period II, Viking Ages and Medieval Period. (After Steinvik 1997, Fig. 7)

already suggested, there might have been a connection between these striking changes within the ironworking activities in Trondheim and an increase in iron production in the town's hinterland. Stenvik has observed that there was a dramatic reduction in the earlier vast iron production areas in Central Norway, and particularly between AD 1000 and AD 1200 most of the iron production sites were located in the valleys of Gauldal and Orkdal to the south of Trondheim and relatively close (Stenvik 1997, 261 and Fig. 7) (Fig. 6).

Town-hinterland relations as a matter of social practice pattern development

Based on the observations in the development of rural and urban metalworking in the 12th century, I advance some theoretical remarks to the comprehension of urban and rural community cooperation in metal production activities as a matter of entangled practice patterns. These patterns were developed by integrating the following elements: (1) *material*, such as natural conditions and climate, iron, charcoal, tools, transportation equipment, storage places, clothes, and even the body itself, (2) *meaning and/or intention elements*, namely the numerous purposes of the transactions not solely explained in economic terms but also in social and cultural terms; and (3) *competence*, such as the knowledge relating to extracting iron from bog ore, storing and transporting the semi-manufactured goods, smelting, fusing, smithing, casting, and refining various metals such as iron, copper, lead, tin, and silver to finished products. These elements were integrated through the involved persons' *performance of the practice patterns*, and the practice patterns were consolidated by the persons' repeated performances, and thus the specific elements of which the practice consisted became entangled. The structure of social practices has the capacity of 'folding up' or 'bunching' people from different places and with different experiences, knowledge, expectations, and ideas through the performance of the practice pattern(s), thus creating the social dynamics in daily life within which people lives their lives, explore their possibilities, and share experience, memories, dreams, and expectations, which is the real nourishment of social change and future development (Shove et al. 2012, 1-2).

Within a traditional processual approach to medieval urban development the relationships between towns and their hinterland are primarily treated either as spatial, dependent on the size, access, use, and quality of the areas surrounding the town, or as economic, in terms of supplying the non-productive urban communities with vital energy, nutrition, and raw materials for urban craft activities. These are important aspects of town-hinterland relations, but the establishment and strengthening of social practice patterns that brought together individuals and groups of people from different environments through the necessary 'doings and sayings' were similarly important, but often overlooked in the discussion of town-hinterland relations in the Middle Ages. Furthermore, a social practice approach in town-hinterland relations does not exclude places, space, and borders (if any), but rather they are modified to *actants* in a wide and complex network of interests, intentions, power, influence, and objectives, thus giving a broader perspective on the materiality, perceived as 'dependencies between humans and things' (Hodder 2012, 97).

Thus, the hinterland connection is principally about how the dependencies between humans and things bring together people, places, knowledge, and material resources through mutual interests and intentions. From this, practice patterns emerge, endure, and cease to exist, which

is exactly what happened in Trondheim around 1150, when a new spatial and productive organization came into being at the Flour Magazine Site and at the same time dramatic changes in the iron production areas took place in the town's hinterland. The reasons for these changes are not known, but I allege that changes in the local urban craft activities cannot be analysed isolated from the social and economic life that took place within the hinterland. We might presume that the introduction of a new and efficient bog iron extracting technology allowed a small group of people that operated the furnaces to become an important prerequisite for the observed changes in the ironworking craft community in the town. According to Stenvik (1997, 259), the new technology gave way to smaller, flexible, organized iron production units, possibly belonging to separate farms in the hinterland of Trondheim, and that subsequently led to productive cooperation or partnerships between urban craftsmen from the Flour Magazine complex and rural-based productive units. This contrasts with a possible earlier organization of metalworking, when individual metalworking craftsmen with small-scale production would have worked with raw materials, possibly scrap metals they had acquired themselves or, in cases where they were a part of an aristocrat's household, had been supplied with. The growth in the need for iron as a raw material could be comprehended as either an increase in the demand for finished products both outside and within the urban community or for being refined into iron rods for export to European countries.

Conclusions

My objective in this article has not been to describe or explain in detail how a possible cooperation between urban and rural iron production units took place or what it included, but rather to demonstrate that such cooperation rested on the development of complex social practice patterns that caused knowledge, ideas, and material resources to converge and entangle. Without understanding the emergence, duration, and decline of these social practice patterns, we cannot understand how medieval urban and rural communities in Norway interacted and influenced each other over time, whether their interactions were based on exchanges of agricultural products, supplies of energy, water, raw materials for the townsmen's craft activities or not.

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