

The Tjarnargata 3c archaeofauna: The Fishing industry and the rise of urbanism in early modern Iceland

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Résumé. La collection de Tjarnargata 3c est la plus grande collection d'os de poissons récupérés et analysés d'une fouille islandaise. C'est également l'archéofaune urbaine de loin la plus grande et la plus riche rassemblée à ce jour en Islande. Les restes de faune proviennent d'une couche d'amas datée des XVII^e au XIX^e siècles, récupérée lors d'une fouille de sauvetage. La collection a une signature urbaine avec une majorité de viande importée d'ailleurs et des espèces nécrophages.

Environ 95 % des os récupérés étaient de poissons, la morue (*Gadus morhua*) étant l'espèce la plus commune, suivie de l'aiglefin (*Melanogrammus aeglefinus*). La distribution des pièces anatomiques indique clairement une production intensive de stockfish dans le cas de la morue, mais les aiglefins semblent avoir été consommés localement. En replaçant l'archéofaune de Tjarnargata 3c dans le contexte historique plus large de l'exportation et des échanges commerciaux, un éclairage nouveau est apporté sur l'histoire de l'industrie de la pêche de Reykjavík et de ses liens avec l'expansion urbaine.

Mots-clés. Industrie des pêches, morue, époque moderne, archéozoologie, Islande.

Abstract. The Tjarnargata 3c collection is the largest collection of fish bones recovered and analyzed from an Icelandic excavation. It is also by far the largest and richest urban archaeofauna collected in Iceland. The faunal remains come from a mixed midden layer dated to the 17th to 19th century recovered in a rescue excavation. Around 95% of the bones recovered were from fish, with cod (*Gadus morhua*) the most numerous species. Element distribution clearly points to intensive dried fish production for the cod but the haddock seems to have been locally consumed. By putting the Tjarnargata 3c archaeofauna in the larger historical context of export and trade new light is shed on the history of the Reykjavík fishing industry and its connections to the rise of urbanism.

Keywords. Fishing industry, cod, early modern, zooarchaeology, Iceland.

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Reykjavík – the Rise of the fishing industry

Reykjavík is situated on the southwest shore of Iceland in a large bay called Faxaflói. According to Íslendingabók written in the early 12th century, the first

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permanent settler in Iceland, Ingólfur Arnarson, built his farm in Reykjavík around 870 and it later became the capital of Iceland (Þorgilsson, 1968; Snæsdóttir, 2001).

The Reykjavík farm and its vicinity are believed to have been continuously inhabited from the Settlement period (Snæsdóttir, 2001). Initially the Reykjavík farm was a powerful chieftains farm but this seems to have changed in the 11th century. During the 11th and 12th century Reykjavík became a traditional Icelandic farm and was in no way especially rich or powerful. The Reykjavík farm was owned by independent farmers until the Danish king bought it in 1616 after having threatened its owner with violence, the farms fishing dividends were what the king coveted most (Óskarsson, 2002).

By the end of the 16th century Reykjavík and the surrounding area had become increasingly focused on fishing and a number of people moved to the area specifically to fish. At the time there were no year round fishing villages in Iceland and farming was the basis of the subsistence economy (Óskarsson, 2002).

The trading site in the Reykjavík area was called Hólmurinn and in 1655 it was the second most remunerative trading site in Iceland and the export of stockfish was the basis for this success. After 1700 a vast majority of Reykjavík's inhabitants earned their living with fishing and fish processing rather than through farming and a small town was beginning to form (Óskarsson, 2002). However Reykjavík did not become a formal and legal market town (kaupstaður) until 1786 with the abolishment of the Danish trade monopoly (Gunnarsdóttir, Stefánsson, 1987).

In 1752 Innréttingar were founded in Reykjavík. The company was founded by many of the most influential men in Iceland and was to facilitate innovation in Icelandic industries focusing on farming, the fishing industry and manufacturing. The company built several houses in Reykjavík for its operations and was the main reason for Reykjavík's increase in status and importance over the following decades despite the failure of the company itself. The houses of the Innréttingar formed the first real street in Reykjavík (Óskarsson, 2002). The street which the site is on, Tjarnargata, started to form around 1801 at the time there were only two other proper streets in Reykjavík (Gunnarsdóttir, Stefánsson, 1987).

Documentary sources on fishing in Reykjavík are very scarce until the 18th century but it is known that fish was the mainstay for the inhabitants of early Reykjavík (Óskarsson, 2002). Reykjavík was not situated on ideal farm land but very well located for fishing with good natural harbors and close to major fishing grounds.

Thirty boats are believed to have been rowing from Reykjavík in 1750, most of them small two man boats. Over the course of the late 18th and 19th century there was a marked intensification of effort (fig. 1), the number of boats rowing from Reykjavík steadily increases but technological advancement is slow. Ships with sails do not come into the fleet until the late 19th century. Fishing took place all year but the main fishing season was during the winter from early

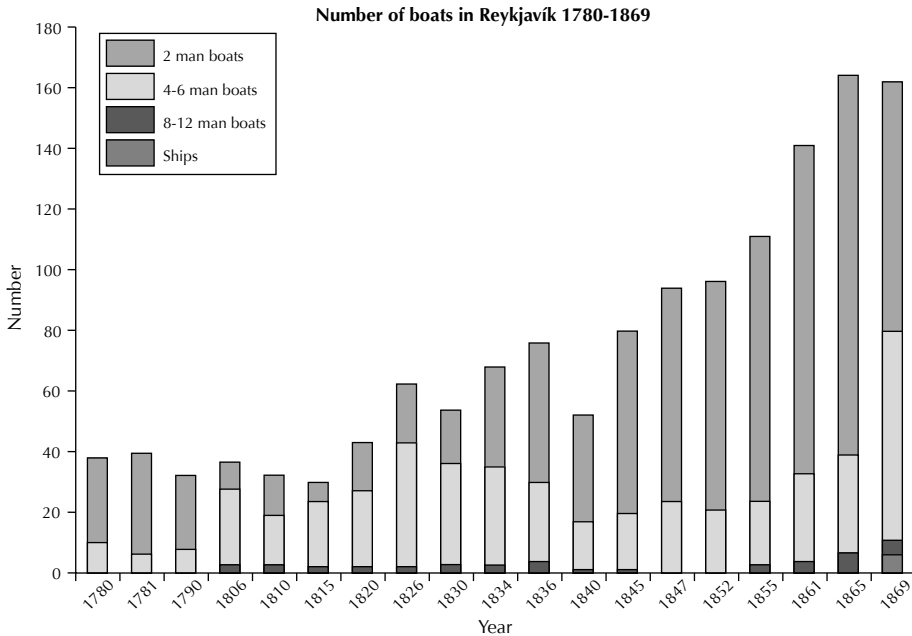


Fig. 1. Note the small number of larger boats during the whole time period (from Óskarsson, 2002).

February till May. Fishermen used mussels, bird and fish for bait and fished only with hand-lines. Fishing nets were introduced in the mid 18th century and slowly gained popularity from then on but they were more expensive than fishing lines which were therefore favored. The Danish trade monopoly from 1602 to 1787 was the main reason for the lack of technological progress in fishing and fish processing. The Danish traders paid a very low price for Icelandic fish which prevented the rise of an independent industry. Most Icelandic fishermen were also farmers or farm workers until the end of the 18th century when the monopoly was abolished and the fishing industry finally started to grow to its full potential (Óskarsson, 2002).

The fish was flattened and kept in stacks until the later half of the winter season when the drying process started. Preparing dried fish was usually women's work. The fish was left to dry on rocks and could dry in as little as 2-3 weeks if the weather was good which rarely happened (Óskarsson, 2002). There are two main methods of drying fish, hanging it to dry in the round or stock-fish and flattening and drying on the ground. These two processing methods have distinct zooarchaeological signatures both in element distribution and size of the fish (Perdikaris, 1998; Perdikaris *et al.*, 2007; Perdikaris, McGovern, 2008). Salting fish was not viable because of the high price of salt and it was also a more labor intensive processing method but salted and dried fish fetched the same price in the market. In the summer of 1769 the fish processing completely failed in Reykjavík due to unfavorable weather conditions which caused many of

its inhabitants to fall into destitution which shows just how important fishing was in the area (Óskarsson, 2002).

The Tjarnargata 3c excavation

The excavation at Tjarnargata 3c was a rescue excavation, an extension was being built for the Icelandic parliament (Snæsdóttir, 2000). A final report for the excavation was never published due to a lack of funding for the project (Mjöll Snæsdóttir, personal communication 2005). The size of the excavated area was 12 by 5 m and a total of 11 different contexts were identified during the excavation ranging from asphalt and gravel layers dating to the construction of a parking lot in 1989 to peat ash and turf layers with artifacts and bones. No building remains were located during the excavation. Bones were only collected from layer 9 which was 40-60 cm thick, a dark brown mud soil mixed with turf and peat ash. The bones were collected by hand picking and wet-sieving through 5 by 5 mm mesh and smaller samples through 1 by 1 mesh. Only about half of the bones in layer 9 were collected due to funding restrictions (Snæsdóttir, 2000).

At the time of the midden formation the area around it seems to have been vacant according to documentary resources and 18th century maps (Óskarsson, 2002; Gunnarsdóttir, Stefánsson, 1987). When the site formed it was next to the Reykjavík pond, about 150 m from the shoreline and the closest house was about 30 m away. The landscape in this area has been altered greatly in the last century.

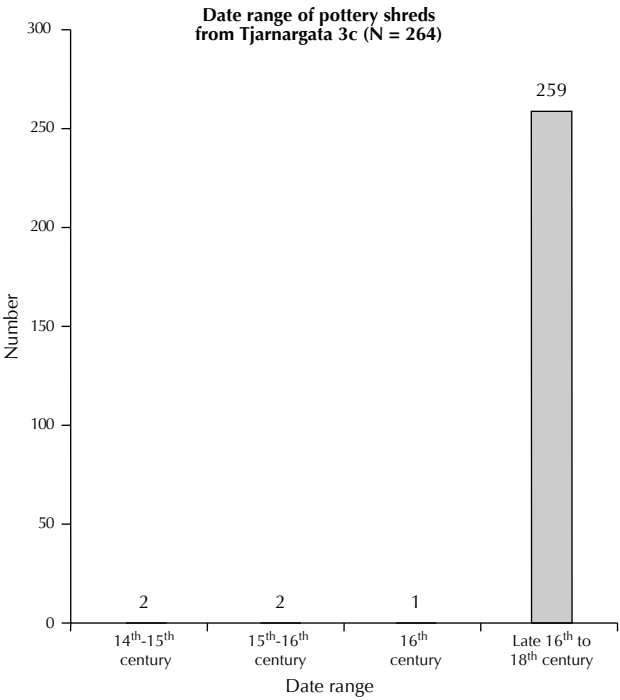


Fig. 2. *The dating and origins of the pottery corresponds well with what is anticipated for the time of the Danish trade monopoly from 1602 to 1787 (from Mehler, 2000).*

The middens location so close to the Reykjavík pond but not next to houses might have been strategic as is afforded access to fresh water a little ways from the main settlement. The midden seems to have formed by rubbish dumping from commercial fisheries activities as well with household rubbish from a high status household in the earlier phases (Snæsdóttir, 2000; Mehler, 2000a; 2000b; 2003).

The artifacts found in the excavation are fragments of clay pipes, whetstones, wooden artifacts and a substantial amount of slag (Snæsdóttir, 2000). The layer that the bones come from seems to have formed over a substantial period of time and consists of refuse deposits from fish processing and some household refuse (Snæsdóttir, 2000; Perdikaris, Amundsen, McGovern, 2002).

Artifacts found in the midden layer suggest that it was deposited in the 17th and 18th centuries. The layer underneath it was a natural peat layer in which a tephra layer from the eruption in the Katla volcano in 1500 AD was seen undisturbed (Snæsdóttir 2000). The tephra gives the layer, which is above it, a *terminus post quem* of early 16th century (Perdikaris, Amundsen, McGovern, 2002).

A relatively large number of pottery fragments were recovered at Tjarnargata 3c, mostly redware and stoneware. Five pottery sherds that could be closely dated are older than the bulk of the material, the oldest dating to the 14th to 15th century. These sherds all came from high quality pottery that could have a high residual age due to special handling. This likely explains why these older types are found in a context that clearly postdates the year 1500 according to the Katla tephra layer found under all of the culture layers. The youngest identified sherds found at Tjarnargata are from the 18th century (fig. 2). The dating and origins of the pottery corresponds well with what is anticipated for the time of the Danish trade monopoly from 1602 to 1787 (Mehler, 2000b). Several fragments of high quality clay pipes were also found during the excavation; all were of Dutch origin and dated to 17th century (Mehler, 2003).

A total of 10 glass fragments were also found in layer 9 that belong to at least three separate vessels, two cylindrical-fluted beakers and one octagonal-fluted beaker, both of which were used to drink beer. These vessel types date to 1500 to 1650 and are of types from Northern Europe and the Hanseatic trade area. This is one of the larger collection of late medieval glass known from Iceland and the glass beakers are likely to have come from a high status household (Mehler, 2000a).

Results and discussion

The bone collection from the Tjarnargata 3c excavation was very large and the preservation was excellent. The collection is in many ways unique for Icelandic archaeology both because of its size and nature. The collection is not directly connected to any excavated buildings and is the only late modern, proto-urban collection from Iceland that has been excavated and analyzed so fully to date (Perdikaris, Amundsen, McGovern, 2002). The collection shows

all of the standard signs of commercial scale fishing, a high ratio of fish bones vs. other animal bones, a low species diversity for fish, with a specific focus on cod, an abundance of fish cranial elements and a focus on fish of specific length (Perdikaris, McGovern, 2008; Perdikaris, Hambrecht, Brewington, McGovern, 2007; Perdikaris, 1998). The artifacts recovered such as glass, pottery and clay popes indicate high status (Mehler 2003; 2000b, 2000a)

The majority of bones that were identified come from fish, around 95% (fig. 3) (Perdikaris, Amundsen, McGovern, 2002). When compared to other contemporary archaeofaunas from Iceland several unusual aspects jump out. Figure 4 shows the major taxa from three early modern sites and compares them with the material from Tjarnargata 3c. The commercial nature of the Tjarnargata 3c becomes clear when compared to other contemporary sites. The Skálholt bishopric of south Iceland was located inland; it owned a large number of farms by the coast which provided it with fish but the bishopric itself focused on cattle farming. Svalbarð was a marginal church farm on the northern coast which utilized a wide variety of marine resources and Finnbogastaðir a poor sheep farm on the Westfjord peninsula which also relied heavily on fishing but for subsistence rather than commercial enterprise (Amorosi, 1992; Edvardsson *et al.*, 2004; Grímsdóttir, 2006; Hambrecht, 2006; Perdikaris, Hambrecht, Brewington, McGovern, 2007).

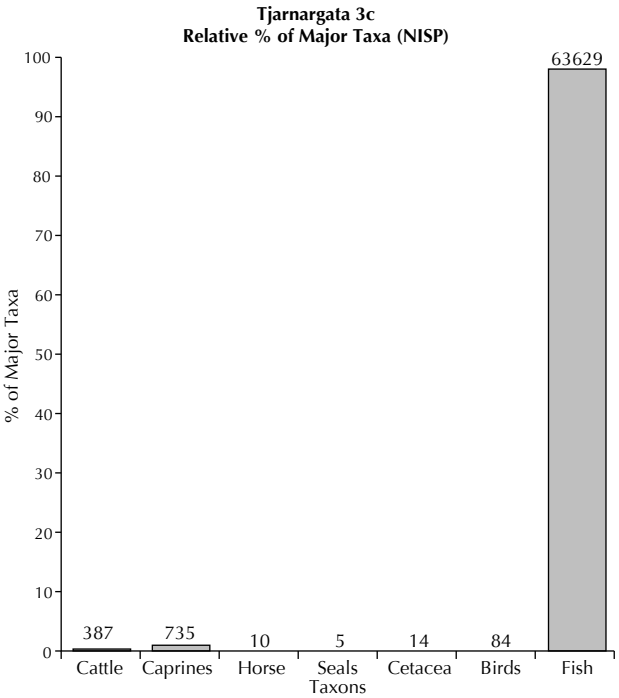


Fig. 3. A high ratio of fish bones vs. other species indicates commercial fishing but also use of other marine resources.

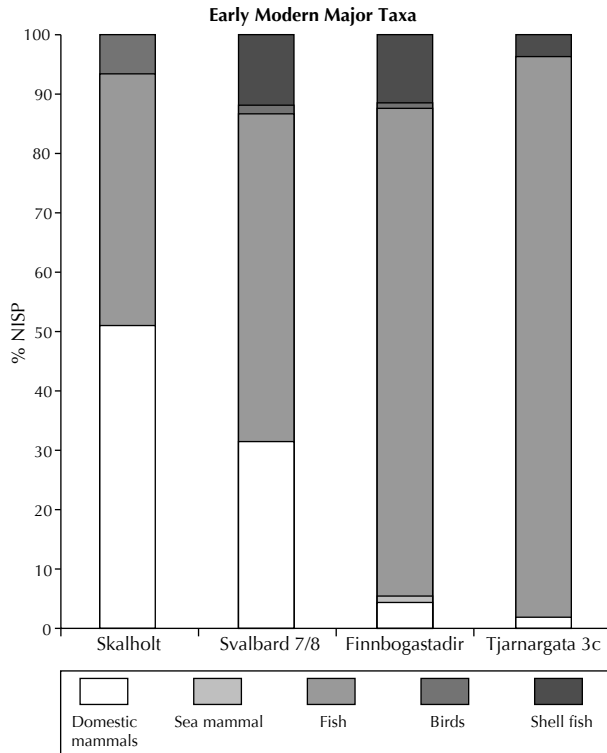
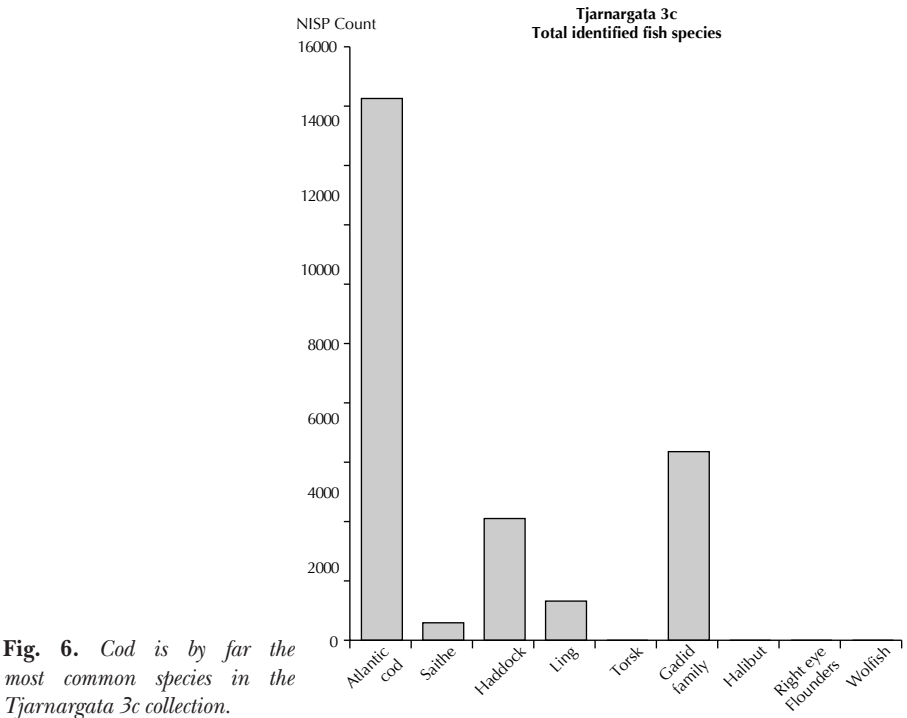
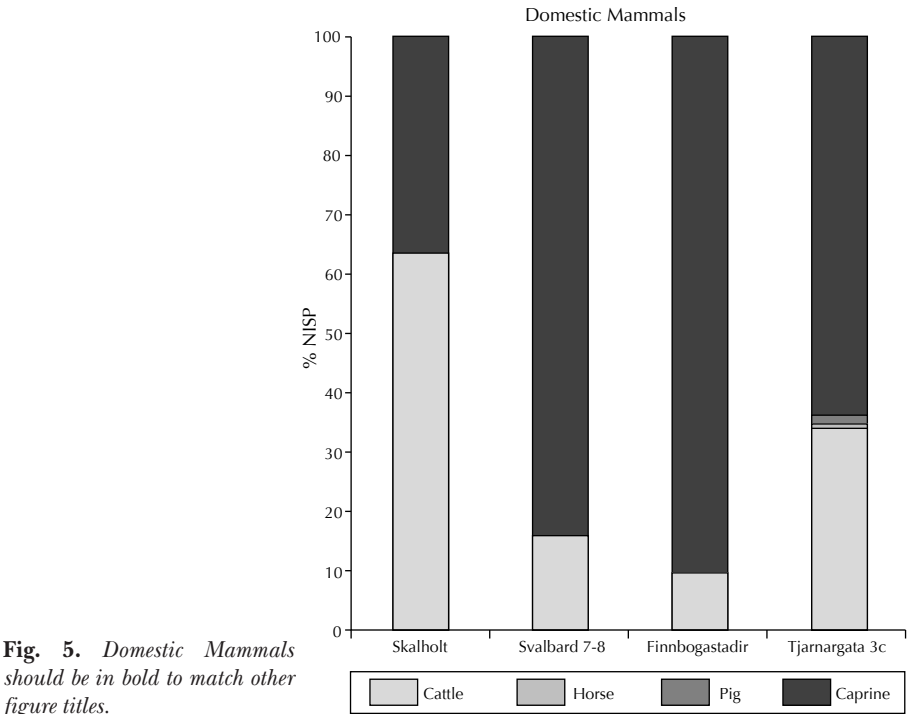


Fig. 4. A clear producer site signature for Tjarnargata, fish bones dominate the collection.

Despite the specialized nature of the Tjarnargata 3c collection the high ratio of cattle vs. caprines (bones of sheep *Ovis aries* and goats *Capra hircus* can often not be identified to species and are therefore combined in a caprine category) indicates high status. When compared with contemporary sites Tjarnargata most closely resembles the high status bishopric of Skálholt in South Iceland (fig. 5) (Hambrecht, 2006).

The clear dominance of cod (fig. 6) fits well with documentary evidence about the nature of the settlement in Reykjavík in the 17th to 18th century. There were no salmonid bones present in the collection which is also in tune with commercial activity. There was a good salmon fishing river in the vicinity and the fishing rights belonged to the Danish king. Reykjavík's location close to some of the best sea fishing grounds around Iceland meant that people did not have to utilize salmon as much as they otherwise might have. The presence of species other than just cod shows that the local fishermen were not only catching fish to process and sell but also relied on the fishing grounds to provide food for local consumption.

Cut marks are rarely observed on fish bone so element distribution is the best way to gain understanding of possible fish processing methods. When dried fish is prepared the head is cut off the body and the fish is flattened. The body of



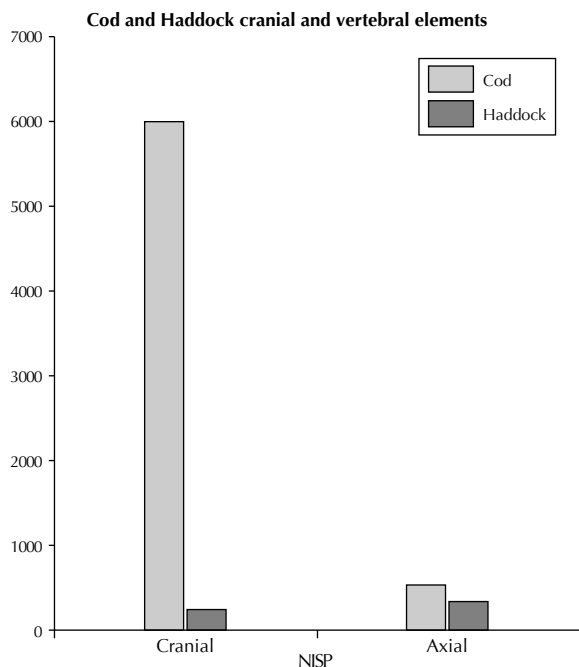


Fig. 7. A clear producer site signature for the Tjarnargata 3c site, the fish heads have been left there while the stockfish has been transported to consumer sites.

the fish along with bones was exported but the fish heads are used locally or thrown away. (Perdikaris 1998; Perdikaris, Amundsen, McGovern, 2002). As this figure shows the majority of cod bone elements found in the Tjarnargata 3c excavation come from the head of the fish. As the head is cut off the body when fish is being prepared this clearly indicates that fish processing was taking place in the Tjarnargata area on a large scale (fig. 7). When the element distribution for haddock is examined the pattern is very different as the ratio between head and body elements indicates local consumption of fresh haddock rather than preparation for export.

The focus on large fish of the gadid family such as cod is also an indicator of commercialization rather than subsistence fishing as large fish was better suited to the drying process (Perdikaris, 1998). The size reconstruction of cod from Tjarnargata 3c as seen in figure 8 shows that most of the fish are between 60-110 cm in total length, which is the ideal size for drying. Element distribution for smaller cod suggests that fish that were too small for drying were kept for local consumption along with haddock and other fish (Perdikaris, Amundsen, McGovern, 2002). The high number of thoracic vertebra from cod recovered in Tjarnargata 3c (fig. 9) indicates that the site was focused on the production of flat dried fish (Perdikaris, Hambrecht, Brewington, McGovern, 2007).

When looking at the vessel forms of pottery recovered at Tjarnargata the abundance of redware tripod skillets is obvious (fig. 10) (Mehler 2000b). What exactly this vessel form distribution indicates is not clear. Tripod skillets and pans

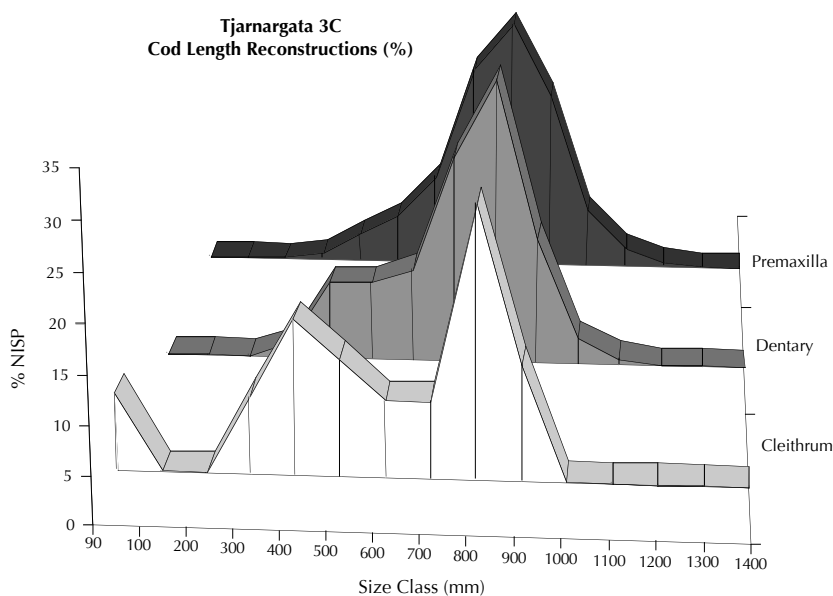


Fig. 8. The cod from Tjarnargata 3c falls within the stockfish window indicating commercial fishing (Wheeler, Jones, 1989; Perdikaris, 1998).

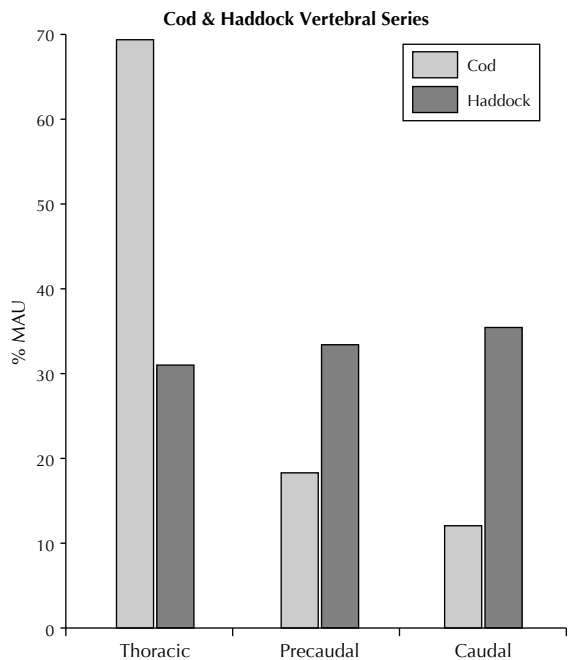


Fig. 9. A clear signature of production of flat dried fish from cod and local consumption of haddock.

are known to have been used for cooking but it is also possible that they were used for some sort of commercial production. The fact that the site is not located in the immediate vicinity of any houses known from historical maps or written resources of the period seems to point to commercial activity when looked at in combination with the vast amounts of fish bones recovered.

The Tjarnargata 3c bone collection has a number of clearly urban features such as rodent gnawing marks, scavenger remains and indications of outside provisioning. A rubbish dump full of fish heads and other refuse as the one in Tjarnargata 3c seems to have attracted a number of scavengers. Dog gnawing marks are not uncommon in Icelandic bone collections from farms but rodent gnawing marks had never been observed before in an Icelandic collection. The rodent marks were most likely made by rats scavenging off garbage (Perdikaris, Amundsen, McGovern, 2002).

There are also bones from at least three medium sized dogs in the collection (fig. 11), probably from feral dogs as they are not from deliberate burials and there is no indication that dogs were ever eaten in Iceland (Perdikaris, Amundsen, McGovern, 2002). Dog bones are rare in midden collections from Iceland (McGovern *et al.*, 2007).

The bird bones found at Tjarnargata also tell the story of scavengers of refuse from human activity. The majority of bird bones recovered are from fulmar (*Fulmarus glacialis*) with some puffin (*Fratercula arctica*) and various gull species. Gulls and fulmars routinely scavenge waste from fish processing and this behavior partially explains their presence in the collection but these species are also known to have been eaten occasionally in Iceland (Perdikaris, Amundsen, McGovern, 2002). It seems that fulmars increase greatly in numbers in Iceland after the start of large scale fishing and their bones are rarely found in sites pre-dating the early modern period (Petersen, 1998; McGovern, Brewington, Pálsdóttir, *in preparation*).

The bone collection from Tjarnargata 3c is relatively unfragmented with a high ratio of bigger bone fragments and it is also mostly unburnt. The lack of attrition is different from that found in most farm contexts where bones were broken up for marrow, fed to dogs and burnt for fuel. The bones in Tjarnargata 3c were simply thrown away (Perdikaris, Amundsen, McGovern 2002; McGovern *et al.*, 2007).

The presence of pig bones in the collection (fig. 11) is interesting as they are rare in Icelandic archaeofaunas after the Viking age (McGovern *et al.*, 2007). Pig meat seems to have been imported in the form of cured hams, probably from Denmark, as only bones of the hindlimb were recovered. Knife marks were common on the recovered pig bones and can be traced to knives of diners rather than to butchery (Perdikaris, Amundsen, McGovern, 2002).

Element distribution for cattle and caprines is by no means as clear cut as that of the pigs but clearly indicates that at least a portion of the meat consumed in Reykjavík came from outside the immediate proto-urban area. There are elements present from all parts of the skeleton but those from very meaty parts

Fig. 10. A fairly wide variety of vessel forms was recovered in the Tjarnargata 3c excavation but tripod skillet fragments were most numerous (from Mehler, 2000b).

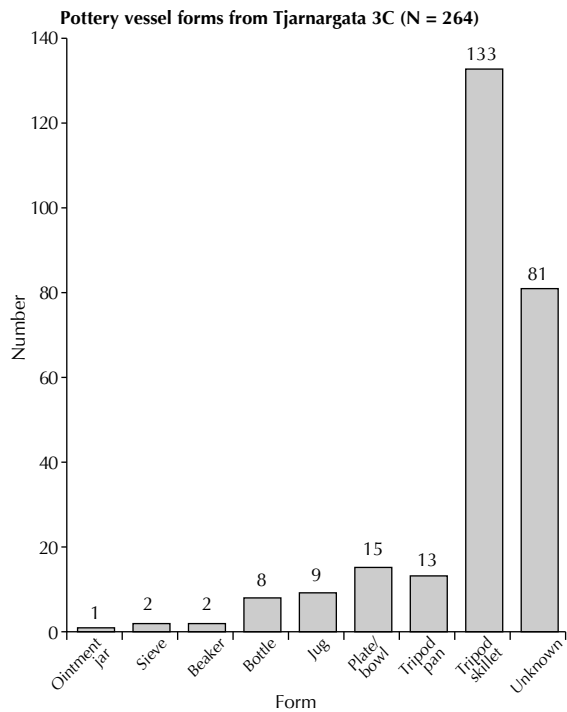
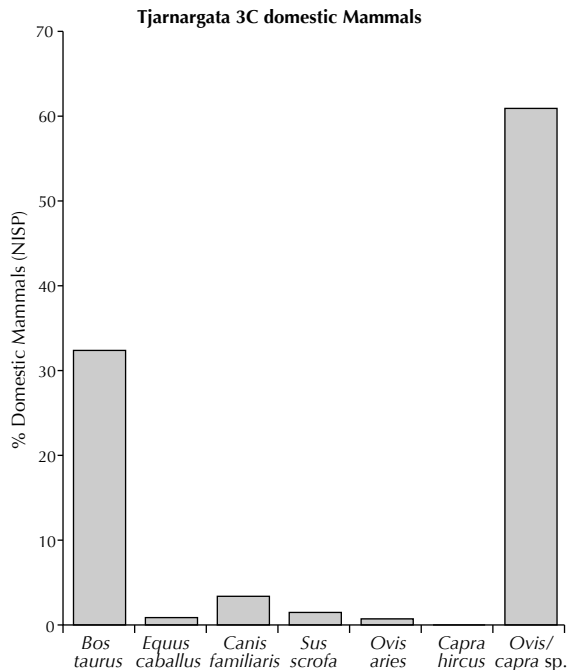


Fig. 11. Note the high ratio of cattle vs. caprines and the presence of dog and pig bones in the collection.



are slightly more common even after different density of bones and other factors have been taken into account (Perdikaris, Amundsen, McGovern, 2002).

There are some notable similarities between the Tjarnargata 3c collection and a traditional Icelandic farm collection. Biperforation for marrow extraction can be seen on several caprine metapodials in the collection but this was a common practice in Iceland from the 11th century (Bigelow, 1984). Cranial elements deriving from the traditional Icelandic dish of halved sheep heads called svið are also observed in Tjarnargata 3c but zooarchaeological analysis of Viking Age archaeofaunas indicates that this dish dates back to the settlement of Iceland (Perdikaris, Amundsen, McGovern, 2002; McGovern *et al.*, 2007). The change from rural society to proto-urban living did not cause a clear break of tradition. The inhabitants of Reykjavík still liked their svið and marrow.

Conclusion

The Tjarnargata 3c excavation is the most fruitful late modern archaeological excavation in Reykjavík and its results clearly show that there is great potential for a better understanding of the lives of people in urban Reykjavík in the 17th to 19th century through archaeological investigation. The results of the bone analysis show clear evidence of commercial fishing and an urban settlement which relied on outside provisioning.

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