Trade Port Dogs

A comparative study of dog bones from the three mediaeval ports of Gásir, Trondheim, and Bergen

Malin Bakke

Master thesis in Archaeology

Fall 2022

University of Bergen, AHKR

Frontpage illustration (Figure 1): *Mediaeval coloured woodcut print showing five different dogs, from a page of the* Ortus Sanitatis *natural history encyclopaedia of 1491.*

List of Contents

Figures

Page	Figure	Description
Front page	Figure 1	Anon. (1491) Five different types of dogs [coloured woodcut print]. From: https://commons.wikimedia.org/wiki/File:Five_different_types_of_dogs,_woodcut,_1547_Wellcome_L0029217.jpg.
p. 18	Figure 2	Author (2022) Areas in question, marked on a map of Northern Europe [map]. (Made with ESRI through NGS: https://mapmaker.nationalgeographic.org/, then edited).
p. 30	Figure 3	The British Museum (n.d.) Dogs' paw prints left in man made constructions, Ur, ca. 2100 BCE [photos]. From: https://www.researchgate.net/publication/308989124_Deconstructing_Textuality_Reconstructing_Materiality.
p. 33	Figure 4	(Same as Figure 1).
p. 36	Figure 5	Author (2022) Norwegian locations in question, marked on maps of parts of Norway [map]. (Made by author, with ESRI through NGS: https://mapmaker.nationalgeographic.org/, then edited).
p. 37	Figure 6	Helle (1982) Illustrated map of Bergen c. 1200 CE, with important landmarks of the time [illustration/map]. From: https://urn.nb.no/URN:NBN:no-nb_digibok_2013081224001 (Edit by author).
p. 39	Figure 7	Helle (1982) Main trade routes of Bergen c. 1300 CE [illustration/map]. From: https://urn.nb.no/URN:NBN:no-nb_digibok_2013081224001 (Edit by author).
p. 42	Figure 8	Nauclér (1658) One of the oldest known maps of Trondheim [map]. From: NTNU UB (Edit by author).
p. 52	Figure 9	Author (2022) Icelandic locations in question, marked on map of the island, as well as a zoom-in of the Eyjafjörður area [map]. (Made by author, with ESRI through NGS: https://mapmaker.nationalgeographic.org/, and edited).

Tables

Acknowledgements

Working on this study has allowed me to combine two of my greatest passions; archaeology and animals. Learning about the science of zooarchaeology opened the door to a whole new world: a research field where studies of animals and studies of the human past meet. Writing this master's thesis, as a last, grand undertaking to complete my master's degree in archeology, has been both challenging and rewarding. At times challenging, for instance in trying to keep up productivity in periods of Covid lockdowns. And at other times greatly rewarding, for instance when given the opportunity to work in the osteological lab of the University Museum of UiB; A place with a great comparative collection and outstanding academics of natural and anthropological sciences.

I am forever grateful for those who have helped me on my way, through ups and downs. A special thanks go out to: Supervisor prof. Ramona Harrison: patience, knowledge, and guidance. Co-supervisor archaeozoologist prof. Anne Karin Hufthammer: vast knowledge and insight. Department engineer Olaug Flatnes Bratbak: knowledge and help with just about anything around the lab. Lab mate postdoc. Veronica Aniceti: help and cheer. These, as well as the rest of the people at the environmental history department of UiB, have been of great value. A huge thank you goes out to fellow archeology MA student and “partner in crime” Marie Aadland: I could not have done it without her by my side. Last but not least, I need to thank my family: My parents, my brother, Alessandro, and Emmi, for always being there for me.

Thank you.

Abstrakt

Denne avhandlingen tar for seg forholdet mellom mennesker og hunder i middelalderens Nord-Atlanterhav (ca. 1030 - 1500 CE). Dette gjennom makro-analyser av zoo-arkeologisk materiale, og data fra tre handelshavner: Gásir (Island), Trondheim og Bergen (Norge). I tillegg vil materiale og data fra enda en islandsk lokasjon, middelaldergården Oddstaðir (beliggende i samme region som Gásir; Eyjafjörður), inkluderes. Målet med denne avhandlingen er å øke vår forståelse av hunder og hundehold i de gitte områdene i den gitte tidsperioden.

Forskningsspørsmålet som står i senter for denne studien er hvorvidt det er mulig å få en økt forståelse av hundene og menneske-hund relasjonene på de valgte stedene, samt å se på hvordan lokasjonene sammenlignes med hverandre. Ved å bruke forskjellige teorier og metoder, har jeg som mål å gi innsikt i hundenes fysiske utseende og deres roller innenfor disse menneske-administrerte samfunnene. I tillegg vil jeg utforske holdninger og praksis mot hundene, inkludert hundenes bruksområder. Stedene som undersøkes i denne studien har blitt valgt basert på deres funksjoner som handelshavn, samt deres sjøveiskoblinger over Nord-Atlanteren.

1. Introduction

This thesis studies dogs and human behaviour regarding dogs in the Medieval North Atlantic (c. 1030 - 1500 CE). The study will be based on zooarchaeological material and data from the three respective trade port sites of Gásir (Iceland), Trondheim, and Bergen (Norway). Material and data from a second Icelandic location, the small inland farm of Oddstaðir (like Gásir, located in the region of Eyjafjörður), will be included as well. My aim for this thesis is to build a further understanding of dogs and dog keeping at the given locations during the given time span.

Figure 2: *The placement of the locations in question (in Iceland and Norway), shown on a map of Northern Europe. As for the Trondheim location abbreviations: TVT = Televerkstomten, FBT = Folkebibliotekstomten, EBG = Erkebispegården.*

1.1 Research question

The focus of this thesis is to see whether it is possible to get a better idea about the dogs themselves and about human-to-dog relationships of the three chosen locations, as well as to look into how they compare to each other. My main research questions thus sound as follows:

- Is it possible to build further on the existing knowledge on the dogs and human-to-dog relationship through visual and morphometric (macroscopic) analysis of the archaeofaunal material?
- In comparing the material of the different locations, can one detect differences or similarities in the nature of these dogs, and how they fit in society?

I will approach this task by asking the following questions:

1) **Can we tell what kinds of dogs were present at the chosen locations in the chosen time span?** (size, morphology/type, age, health/pathology, care)

   The goal here is to use archaeofaunal analysis for a better idea of which types of dogs were kept by the people at the locations in the mediaeval era. Age at death and pathology could give insight into the health of the dogs, and potentially witness of neglect or care given them by the humans of the society (Hufthammer, 1994, pp.218-219; pp.233-237; O'Connor, 2000, pp.80-90; pp.98-110).

2) **Can we tell how the dogs fit in the society at the chosen locations in the chosen time span?** (roles, use, value, disposal)

   By addressing the former question about dog types we can then move on to ask questions about the dogs' roles and use in society. By looking at examples from historical literary accounts (e.g. city laws, and church legislations), as well as modern age practices, dogs of certain sizes and morphology have been used for certain types of tasks (Hufthammer, 1994, pp.218-231; Simonsson, 2006, pp.11-12). For example, depending on the dog's task or role, a certain value would be given to it (e.g.:

Hufthammer, 1994, pp.218-219). Beyond the dog's anatomical features, observing the way a dog was disposed of after it died can be used as one indicator of how humans may have treated and valued it during its lifetime (e.g.: Perri, 2016).

3) **Can we extract more information from the previously analysed archaeofaunal material based on visual and morphometric (macro-) analysis?** (review and additional analysis)

   All the chosen archaeofaunal materials have been analysed prior to this study. These analyses were done by different experts and to different extents. In order to compare the different collections as best as possible, I have added criteria through my own analysis. The aim is thus to create further insight into the material in question, as well as start a discussion on how far interpretation of zooarchaeological material can be taken based solely on visual and morphometric analysis.

4) **Can we tell how the locations compare to each other in regards to dogs?** (in asking the two first questions)

   Lastly, I wish to look into how the dog remains from the different finds locations compare. I will attempt to create insight into whether these locations, which we know have had contact, at least periodically, throughout the mediaeval era, show any similarity to each other in regard to the two first questions.

I aim to address these questions through the use of the theories and methods described and discussed in chapters 3 and 4 respectively.

I aim to create an insight into the dogs' physical appearance as well as their roles in these human-administered locations. I will try to make a better understanding of the dogs' role in the respective society and social group of the given time and space, and further aim to address people's views of the dogs together with their use and care practices towards them. I have consciously chosen three main locations that have had functions through trade and seaway connections, all throughout the North Atlantic area in the Mediaeval era. Thus, the material is suited for comparisons, to give us insight into whether there has been a similar pattern of dogs and dog keeping across the different ports.

The topic will be approached through methods of zooarchaeology and social zooarchaeology, looking at dog bones recovered from archaeological sites. Previous research done on the area, as well as literary sources contemporary to the archeological material, will be important too. The amount of previous work done on the selected material varies. For some locations, the only work done is the initial post-excavation analysis, while material from other locations have been looked at again and included in more recent studies. For the locations where relevant work has been carried out, I will presumably mainly contribute with the comparison of them against other locations. For the places in which the dog remains have not undergone extensive investigations, I will provide new data at a more minute level.

To determine factors like age, size, health, use, and value, I will use methods such as:

- age determination based on epiphyseal fusion, tooth eruption, and tooth wear,
- size reconstruction, based on recalculations of the measurement of long bones, as well as comparisons to sizes of modern specimens,
- health, based on pathologies visible in the bone material,
- use of dogs as a source of food and/or pelts, through the identification of cut and butchery marks present on the bones,
- the value given the dogs by the people of the society, by, e.g., looking at disposal place and method,
- comparison of the material of the different locations, to see how they differ from each other, and whether there are similar patterns to be found.

See the methods chapter (**chapter 4**) for more in-detail explanations of the methods and how I plan to utilise them.

1.2 Research Plan

1.2.1 Material

I plan to approach the research question through looking at both work previously conducted as well as through new macro analysis carried out myself. In regards to archaeological material, my study will only include analyses of the dog bones themselves.
I have not included other archaeological material that could be related to dogs. For instance items like dog collars, leashes, etc., tools used in interaction with the dogs, have not been looked into. I have not checked whether or not such items have been found at the chosen locations. Another type of source relevant is dog-like depictions and figurines. This category, for the locations in question, has also not been included.
Some contemporary literary sources will be included in the study, as a means to shed light on the humans' view of the dogs present in the given societies. More on this in the coming chapter (**2.1.4** Medieval Dogs).

1.2.2 Theory

I have chosen to look at the material using the actor-network theory, with the aim to place the dogs (being the actors under investigation) in their respective networks (the societies of the chosen locations). This approach will let me study the dogs' overall roles in society, not necessarily as pure human-managed objects. The possibility of the dogs studied having subject-oriented roles in the given societies will be considered as well, in looking further than the past trend of the utilitarian perspective of human-animal interaction. More in-depth information and discussion on the theories considered in this study will be presented in **chapter 3**.

1.3 Thesis organisation

In this chapter I first presented my research question and research plan. Following, I will explain the different parts of the thesis; the thesis organisation. At last, I will proceed to explain some terminology that will be used throughout the text. In **Chapter 2**, I will present the field in which this study is conducted. I will then go on to give a brief presentation of the historical time and space of the topic. Lastly, I am presenting the work conducted previously on the topic and locations. **Chapter 3** will explain the main theories relevant to this study, as well as the main theory used to analyse my data. The procedures used to extract and analyse the data are given in **Chapter 4**. The data previously collected, as well as the data collected myself, are both presented in **Chapter 5**. Finally, **Chapters 6** and **7** will contain Discussion and Conclusion respectively.

Here follows a more thorough explanation of the information that will be provided in the different chapters included in this thesis.

Chapter 2: Research History

In chapter 2 I will present the history of the different aspects of this thesis. First I will introduce the research field in which this study is conducted, namely the field of zooarchaeology. I will present a brief history of how the field came to be. Next, a short history of the study of dogs in archaeology will follow. Then follows some examples of literary sources which might give some insight concerning dogs in Mediaeval society.

The next part of the Research history chapter will concern the locations in question. Before getting into the relevant archaeological work and material, I will first give a short introduction to the chosen areas in the given time span, which are Norway and Iceland in the Medieval Era. This to give a better understanding of the *context* in which the dogs, of which remains I'm presenting to you, once lived. Potentially big shifts in society can also be detected in the zoo-osteological material.

After presenting a brief history of the areas in question I will finally get on to the archaeological projects which my material derives from, and lastly, I will introduce the zooarchaeological material derived from them. The general information on the osteological

analyses will be presented here, while the data produced on dogs will be presented in its own section of the data chapter (subchapter **5.1**).

Chapter 3: Theoretical Approach

In chapter 3 the theoretical approach of the thesis will be introduced in more detail. I will briefly present archaeological theory, as well as zooarchaeological theory, before introducing the chosen theoretical approach of the study (Symmetrical archaeology and Actor-network theory).

Chapter 4: Methods

In the methods chapter I will list all methods considered and used in this study. At the end of the chapter, I will briefly mention methods I have not touched upon in this thesis, but that could prove fruitful in regard to further work on the material and topic.

Chapter 5: Data and Results

In chapter 5, both previously collected data, as well as my own data will be presented. First I will go through all data and related comments and claims made, in regard to dogs of the chosen locations, by those who have visited the topic before me. Subsequently, I will present the data collected by me (using the methods discussed in the foregoing chapter), for this study. Lastly, comparisons will be made. Both comparisons of the previous data and results to those produced by me, as well as comparisons of the different locations to each other. The first is to see how my results compare to those of others. And the latter to see whether it is possible to discuss inter-locational similarities and differences based on the studies conducted.

Chapter 6: Discussion

In the discussion chapter the research questions of this thesis will be discussed considering the data presented in the foregoing chapter. It will all be examined through the theories discussed in chapter **3**.

Chapter 7: Conclusions

In the last chapter I will present my findings and the conclusions of this study. This will include my interpretations of the results achieved. I will also touch upon ideas as to how the topic possibly could be further enlightened in the future.

1.4 Terminology

Before getting on with the thesis, I will here clarify some terminology and abbreviations that will be used throughout the text.

Canis familiaris: For the animal in focus, both the terms "dog" and "Canis familiaris" will be used. The Latin name, *Canis familiaris,* will be used as it was coined by Linnaeus in 1758 (Reitz & Wing, 2008, p.291; Wallis, 2019, p.5).

Dog breeds: Dog "breeds" can be seen as a way of categorising types of dogs. Dogs of the same breed will share outer appearance, size, as well as other physical traits (including morphological type). Mentality and behaviour are also linked to the type of dog. The different dog types have all been shaped by human influence, to carry out different tasks at hand. In this thesis both dog "type" and dog "breed" will be used to group similar dogs. The reason for the two different terms is that what we think of as a "breed" today is thought to have originated as late as the 19th century. This as the focus centred on having truly fixed characteristics within a breed, often composed of closely related individuals. For dogs of similar traits before this it is more common to use the term "type" (or "natural breed"), for when the characteristics were not as fixed, and the dogs' ability to carry out the tasks it was needed and kept for was most important (Duffy & Serpell, 2014, pp.31-34; Makowiecki, 2006, pp.63-65).

Dog sizes: See **Methods chapter, subchapter 4.3** for dog size categories.

Pets: In archaeology, the term "pets" is usually used for those animals which were kept for companionship and entertainment, rather than having a role in everyday economy. As pets

would cause more expenses than income, these types of animals are, from a pre-historical and historical point of view, seen as a privilege for the upper strata of society (Bergland, 2014, pp.74-76; Duffy & Serpell, 2014, pp.31-34; Makowiecki, 2006, pp.63-65).

Trade port: The term "trade port" will in this thesis be used regarding settlements, both seasonal and permanent, located at a waterfront. "Trade" as being a big (if not the main) characteristic of the settlements, and "port" as in that they were accessible by ship. I have used these two terms as explained by Darvill (2008), where "trade" refers to *"the transfer of goods between communities"*, and "port" as *"a settlement situated on a river or coast whose occupants were engaged in water-borne trade, commerce, and industry, including fishing"* (Darvill, 2008, p.358; p.466).

Kaupang: A word of Norse origins, used to describe a location dedicated to trade (e.g. a trade town, or a marketplace)(Kaupang, n.d.; Solberg, 2003, pp.299-300).

VA: Abbreviation for "Viking Age". In this thesis, used for the time period of the Nordics and Nordic settlements, leading up to the MA. Circa 800 - 1030 CE (Darvill, 2008, pp.488-489; Solberg, 2003, pp.212-219).

MA: Abbreviation for "Middle Ages" or "Mediaeval Era". In this thesis, used for the time period of the Nordics and Nordic settlements, from the end of the VA and leading up to the Modern Era. Circa 1030 - 1500 CE (Darvill, 2008, pp.274-275).

TNF: Abbreviation for "Total number of fragments", which is the sum of all fragments, either per site, or per context. It does not matter if it can be identified to taxa, family, or species level, or only referred to as unidentified animal bone (O'Connor, 2000, pp.54-57; Reitz & Wing, 2008, pp.167-168).

NISP: Abbreviation for "Number of identified specimens". The portion out of the TNF that could be identified to taxa/species (O'Connor, 2000, pp.54-63; Reitz & Wing, 2008, pp.205-213).

MNI: Abbreviation for “Minimum number of individuals”. How many individuals of a species can be identified from the osteological collection (O’Connor, 2000, pp.54-63; Reitz & Wing, 2008, pp.205-213).

Trondheim locations:

Because of the length of the names of the Trondheim locations, abbreviations will often be used instead of the full name.

- TVT = Televerkstomten
- FBT = Folkebibliotekstomten
- EBG = Erkebispegården

Skeletal elements: For the abbreviations of the skeletal elements of the dog I followed the NABONE recording system codes (See **Appendix 1**)(NABONE, 2008, pp.5-6).

2. Research History

Here, I will introduce work previously done on the chosen theme, places, and material. To better understand the origins and importance of the field, I will start by introducing the initiation and historical developments of the research field which I am working with, as well as its history at the University of Bergen. I will then continue by introducing relevant work previously carried out on the locations and materials I am working on in this thesis.

2.1 Research Field

Since this thesis is a study of animal remains from archaeological cultural contexts, it can be described as being an *environmental archaeology* study. Environmental archaeology is the field of studies where one applies information and techniques from the natural sciences to study the human past (Reitz et al., 1996, p.3).

Environmental archaeology can be divided into four sub-fields; earth sciences, archaeobotany, zooarchaeology, and bioarchaeology (O'Connor, 2000; Reitz et al., 1996; Reitz & Wing, 2008). My study on dog bones belongs in the zooarchaeology subfield.

Zooarchaeology is the study of mainly subfossil, non-human animal remains from archaeological contexts. In addition to mammals, fish, and birds, one can derive data from creatures like mollusks, crustaceans, insects, and parasites as well. The way in which the study of these can be applied to archaeology is when they can tell us something about the human past. This trough information on animal resources, people's foodways, husbandry practices, butchery techniques, care for animals, health of humans, et cetera (O'Connor, 2000; Reitz et al., 1996; Reitz & Wing, 2008).

2.1.1 Zooarchaeology

"while palaeontologists will focus on the animals themselves, zooarchaeologists investigate their relationships with humans"

- Albarella, 2017, p.2

As explained, zooarchaeology is the subfield of archaeology that deals with animal remains. The research field emerged in the 19th century, but did not become its own distinct discipline before c. 1970. Before this, it was common for zoologists and palaeontologists (with biology background) to analyse the subfossil (archaeological) animal remains.

Circa mid-1960s there was a shift within archaeology as a science; one went from being highly descriptive, towards using more clear-cut scientific approaches. Some ten years later scientists with experience in both biology and archaeology started developing methods to use when working with archaeological animal remains, and thus created the field of zooarchaeology (Broughton, 2015, p.849; Johnson, 2010, pp.12-34).

2.1.2 Dogs in archaeology

Dogs are presumed to be the earliest domesticated animal, and have lived side by side humans for more than 10’000 years (Duffy & Serpell, 2014, pp.31-32; O’Connor, 2000, p.149; Reitz & Wing, 2008, p.291; Wallis, 2019, p.1). This, as well as the dogs’ status in the modern world, as a cherished companion, has made dogs a popular theme in studies of many fields, archaeology included. Common topics surround trying to place dogs in their respective prehistoric societies. The dogs’ role and status in society seem to have varied quite a bit, both in time and space. Even dogs existing simultaneously in the same vicinity could have had very different roles and values, depending on variables like size and who owned them. Therefore, it is a fairly tough task to interpret dog remains from archaeological contexts. Nevertheless, different methods to uncover different information about archaeological animal and dog remains have been established. New methods are continuously being developed and tested, to further our understanding of the material (see more on methods in chapter **4**) (Albarella, 2017, pp.3-10; Bergland, 2014, pp.65-77; Perri, 2016, p.1).

Figure 3: *Dogs and humans, side by side: Dogs' pawprints left on inscribed clay building bricks. Stemming from the Ziggurat of Ur, ca. 2100 BCE.*

2.2 Mediaeval dogs

Contemporary written sources can be used to contextualise the zooarchaeological material at hand (see more regarding using contemporary literature as a source in section **3.1**). Below are a few examples of North European MA literature concerning dogs, which might give us some insight into the human-dog relationships of the era.

2.2.1 Laws

As Hufthammer (1994), Bergland (2014), and Skaar (2014) all have touched upon in their studies, written sources, like contemporary laws, can give us a glimpse into how people perceived and interacted with dogs in the given time and space (see subchapter **2.3**, on *Bryggen*, *Folkebibliotekstomten*, and *Norway overall* for said studies).

An example of such laws is the Irish ones discussed in "A Synod of Wise Men: Concerning Dogs" (lat.: *De canibus sinodussapientum*), a Hiberno-Latin canon. This text presents four different dog types, considered to make up the dogs of early Medieval society; Two types of

guard dogs, the hunting dog, the shepherd's dog, and the lap dog (Simonsson, 2006, pp.11-12).

The four groups of dogs of *"A synod of wise men: Concerning dogs"*				
Group	**Name**	**Type**	**Role**	**Morphology**
1	*cú chethardoruis*	Guard dog	Guard dwelling house, animal pen, or animal shed. Alert of (and potentially bite) intruders.	Potentially of any size, as the bark to alert its owners would be effective regardless. The use of bigger dogs, whose bite would be effective as well, was though recommended.
	árchú	Guard and war dog	Trained to kill. Usually owned by lords, and sometimes brought to the battlefield to fight alongside them.	Large and strong, with an effective (fatal) bite.
2	*mílchú*	Hunting dog	Used to hunt the likes of deer, wild boar, and hare. Usually owned by lords.	Preferably small and light. A gracious dog with the ability to track prey.
3	*conbúachaill mórchethrae*	Shepherd's dog	Herd (large) livestock. Important to the farmer, and of great value.	Preferably small and light (herding "does not require a monster").
4	*orcae*	Lap-dog	Company dog of the lords' wives. Entertainment at feasts.	As the type category suggests, a small dog.

Table 1: *The four types of dog presented in the early mediaeval Hiberno-Latin canon of "A synod of wise men: concerning dogs". (Based on information from: Simonsson, 2006, pp.11-12). (Table by author).*

Classifications like these can give us an idea of what to look for in the analysis of dog bone material. Bigger dogs found could have been of the guard and war dog types, medium and small gracious dogs (typically long and slender) could have been hunting dogs, medium to small working dogs could have been shepherds' dogs, and dogs of the smallest size could have been kept as lap-dogs (e.g.: Hufthammer, 1994, pp.218-231; Rawcliffe, 2018, pp.45-62; Simonsson, 2006, pp.11-12).

2.2.2 Other literature

Other literary sources, even though they often cannot be used as direct contemporary accounts, can prove valuable as well. For instance, we have the sagas and other story-telling texts, presenting important people and events of the past. In regards to dogs, the Norse *Njál's Saga* (Iceland, c. 1280) speaks of the Irish dog Sàmr. Another example is *Heimskringla* (Norway/Iceland, c.1220), where there is the appraised herding dog Vìgi; a dog from Ireland said to have been owned by the Norwegian king Olav Tryggvason (c. 968-1000). Both these accounts of Irish dogs in Norse societies seem likely to reflect an international trade or exchange of dogs. The fact that they were included in the sagas, even one alongside a king, might tell us something about their status and value in society (Bandlien & Norseng, n.d.; Magerøy, n.d.; Nordbø, n.d.; Simonsson, 2006, pp.11-12).

Figure 4: *Mediaeval coloured woodcut print showing five different dogs, from a page of the* Ortus Sanitatis *natural history encyclopaedia of 1491. A potential witness of a broad morphological span of dog types existing already in the MA.*

2.3 The locations in question

Here I will present a brief research history of each location in question, as well as of its relevant osteological material. First I will shortly list general information about the projects and excavations carried out, then go into the osteological material derived from them. Looking at the osteological material, I will also present information and knowledge that has been achieved through previous work done on the material. The results these studies yielded in regards to dogs will not be presented here, but later on, in the Data and Results chapter (chapter **5.1**).

As most of the initial reports on the osteological material include information on all species present, I have had to extract the information relevant in regards to the study of dogs.

For each location, I will also be reporting on some further studies done, relevant to the chosen topic and material. These are studies on the likes of urban MA foodways, animals, and dog morphology, where parts of the material selected for this study was included.

<table>
<tr><td colspan="7">European North Atlantic</td></tr>
<tr><td colspan="5">Norway</td><td colspan="2">Iceland</td></tr>
<tr><td colspan="2">Bergen</td><td colspan="3">Trondheim</td><td colspan="2">Eyjafjörður</td></tr>
<tr><td>Bryggen</td><td>Dreggen</td><td>TVT</td><td>FBT</td><td>EBG</td><td>Gásir</td><td>Oddstaðir</td></tr>
</table>

Table 2: *Locations in question, divided into respective areas. Abbreviated location names: TVT = Televerkstomten, FBT = Folkebibliotekstomten, EBG = Erkebispegården. (Table by author).*

2.3.1 Norway

As the standing laws and legislations of the MA also included regulations in regards to the use and treatment of animals, it is important to have at least a basic knowledge of the political situation of the studied areas when making an approach to the human-animal relations present. Throughout the MA both the king as well as the church had power, and could lay down laws for the people to follow.

For Norway, it is common to draw the outer lines of the Medieval Era from circa 1030 to 1500 CE (Darvill, 2008, pp.274-275). Previous to 1130 both kings and chieftains would be in the fight for power. By 1130 kings had achieved power over the chieftains, and one had the two first kings to rule a unified Norway. Regarding trade and marketplaces, these were usually controlled by the local chieftain or king. Being in control of a *kaupang* gave those in control access to luxury goods, which in turn would help them maintain their high status in society. In the early MA, the chieftains and kings would both want control of the regional marketplaces. As the kings had control of the cities in the MA, they would place the trade

centres there, to make sure they were the ones to get the benefits that followed (Sigurðsson, 1999, pp.9-15; pp.87-90; pp.110-111).

Religion can play a vital role in how humans interact with certain animals, and changes are found to have taken place with the arrival of Christianity to Norway (e.g. Skaar, 2014, pp.71-74). Archaeologists have proven the presence of Christian impulses in western Norway as early as c. 700 CE. In the 11th century, Christianity became the only legal religion of the kingdom, replacing the old, "heathen" Norse religion. At the beginning of the millennium, the kings were the head of the church, giving them more influence and power over their people. At the end of the 11th century three bishoprics were established in Norway, one in each of the three biggest cities of the MA; Trondheim, Bergen, and Oslo. In 1152-53 an archbishopric was established in Trondheim, making the church more powerful and independent. By the latter half of the 12th century, the church was no longer underlain the king, and stood as a strong, independent power (Sigurðsson, 1999, pp.91-100; p.111).

The growth in the number of people, power, and economy one had seen so far in the MA rapidly turned to a decline at the arrival of the Black Death in the autumn of 1348 CE, and to western Norway one year later. The state had grown weak, and seemingly not quite able to recover. In the period of 1397-1442, Norway was part of the Kalmar union, a union of Norway, Sweden, and Denmark, with Erik of Pommern as king. And by the time of the reformation in 1536, Norway was underlain the Danish crown (Benedictow, 2016, pp.113-151; Rasmussen, n.d.; Tønnesen, 2020, p.3; p.7).

2.3.1.1 Norway archaeology

In Norway, a great number of archaeological projects in mediaeval towns were carried out in the latter half of the 1900s. Among these: *Oslogate 7* (1972), and *Mindets tomt* (1970-76) in Oslo, *Rosenkrantzgate 4* (1978-79 and 1981) and *Dreggsalmenningen* (1979) in Bergen, *Folkebibliotekstomten* (1973-1985) in Trondheim, as well as projects in Skien, and Tønsberg. This as Riksantikvaren (the Norwegian Central office of Historical Monuments and Sites) in the 1950s got an increased interest in investigating settlements and urban areas. The urban projects were not the first excavations carried out in these towns, but they were pioneering in the ways and detail they collected and registered their finds. This as at the time big changes

were taking place within the ways of carrying out archaeological work. The projects yielded a big osteological material, and thus put in motion the work of piecing together a bigger picture of the animal life in and around the towns in the past (Blackmore & Vince, 1994; Hufthammer, 1999; Marthinussen, 1992; Molaug, 2008; Undheim, 1985).

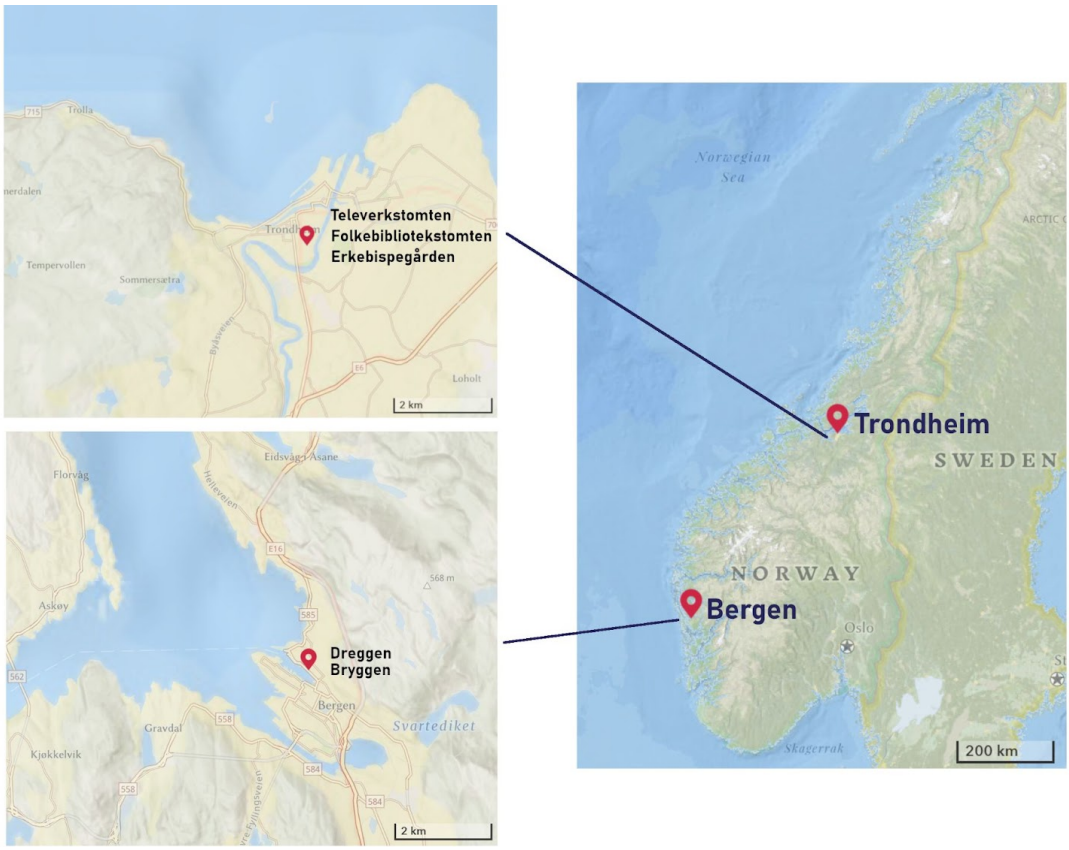


Figure 5: *Maps showing where in Norway, as well as where about in the respective cities, the chosen archaeological locations are.*

2.3.2 Bergen

Here I will first introduce the historical backdrop of Bergen, including some important historical events affecting the MA town. Following, I will present the archaeology of MA Bergen, as well as the excavation projects of the chosen locations.

2.3.2.1 Bergen history

Contemporary sources talk about king Olav Kyrre (reigning 1066-1093) setting a market place (NO: “satte kjøpstad”) alongside Vågen (in today's Bergen) in 1070. Exactly when the trade activities started out is not sure, but is believed to have initiated earlier than the king’s “setting” of the kaupang. Placing a market which could incorporate seaborne trade, at Vågen, rather than at the royal estate some hundred metres east, proves logical when looking at the local topography and its history. Vågen was a shielded harbour with still waters, somewhat narrow yet deep, good for ships to come in and dock there (Dahl, 2000, pp.13-16; Helle, 2019, pp.43-45; Sigurðsson, 1999, pp.88-89).

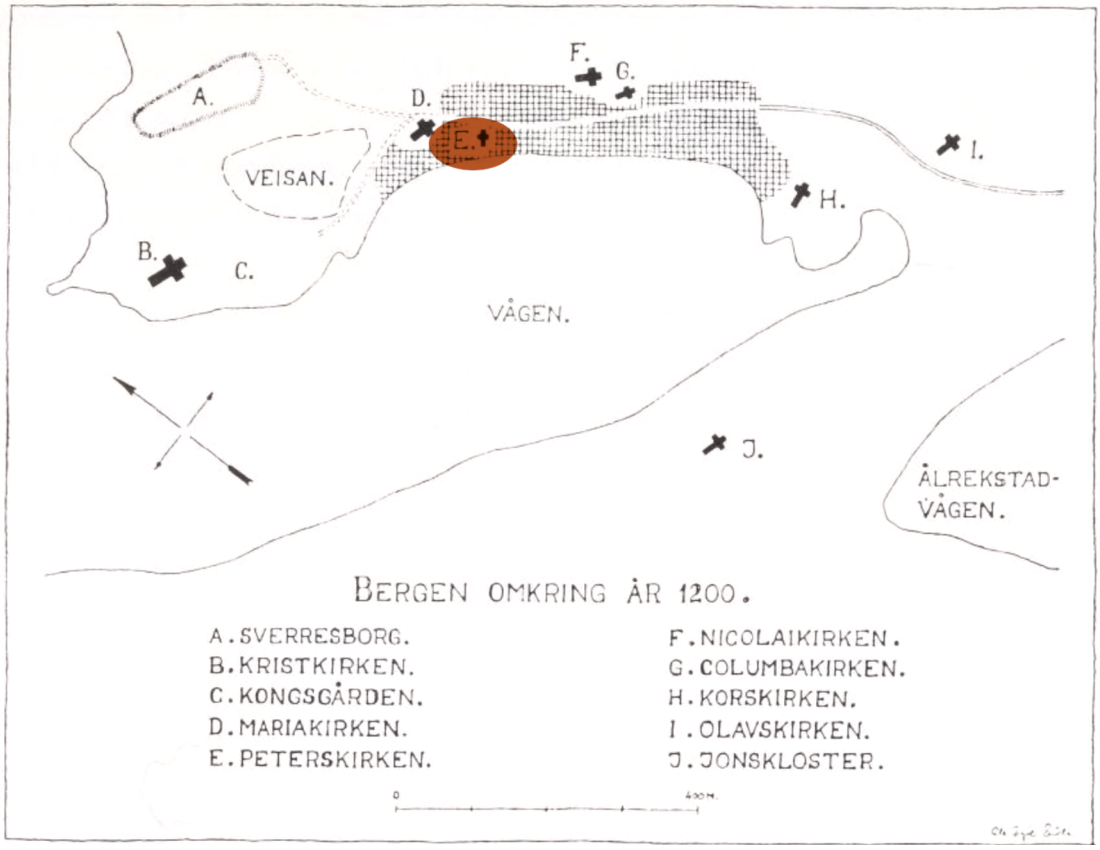


Figure 6: *Map showing what Bergen is thought to have looked like circa year 1200. Included, and marked by letters A through J, are important monuments of the mediaeval town. The osteological material dealt with in this thesis originates from excavations done in the vicinity of D. and E, within the area marked in orange.*

Bergen's location seen in the bigger picture would also become of great importance. Its placement was ideal for the seaborne trade of the North Atlantic. The main export of stockfish would come to Bergen from northern Norway, and be distributed from there. There were already established sailing routes in connection to the island communities in the west, so traders of these, as well as those of eastern England and elsewhere in northern Europe, would come to Bergen to buy stockfish in return for their own goods. As of this, by the MA the North Atlantic trade was centred on Bergen (Helle, 2019, pp.43-45).

By 1100 CE there had been established a permanent bishopric in Bergen, thus making the town the seat of the regional ecclesiastical power. In c. 1200 the royal seat moved from Trondheim to Bergen, as the House of Sverre (NO: *Sverreætten*) took the throne. By the end of the 13th century the royal seat had partially been moved again, this time to Oslo in the east (Sigurðsson, 1999, pp.97-100; p.110; pp.140-146).

As for the trade, also Icelandic stockfish was traded through Bergen by the 1340s. The import of Icelandic stockfish was run by the Hansa, who at that time had already had an office in Bergen for several hundred years. At the middle of the 14th century, a trade ship coming to Bergen from England brought the Black Death with it. The plague would come to strongly reduce the population of the town (Benedictow, 2016, pp.135-146; Helle, 2019, pp.43-45).

The Hansa were a German trade league, with their main seat in Lübeck. The Hansa got involved with trade at many important MA North-European commercial sites, among them Bergen. In Bergen there was established a Hanseatic colony at Bryggen, with ca. a thousand permanent settlers, as well as the double in sailing season. The Hansa had their own set of rules and legislations within their colonies, allowing them to largely continue their ways also abroad. As for Bergen, the Hansa took part in controlling and running the further distribution of the stockfish coming down from northern Norway (Øye, 2014, pp.481-489).

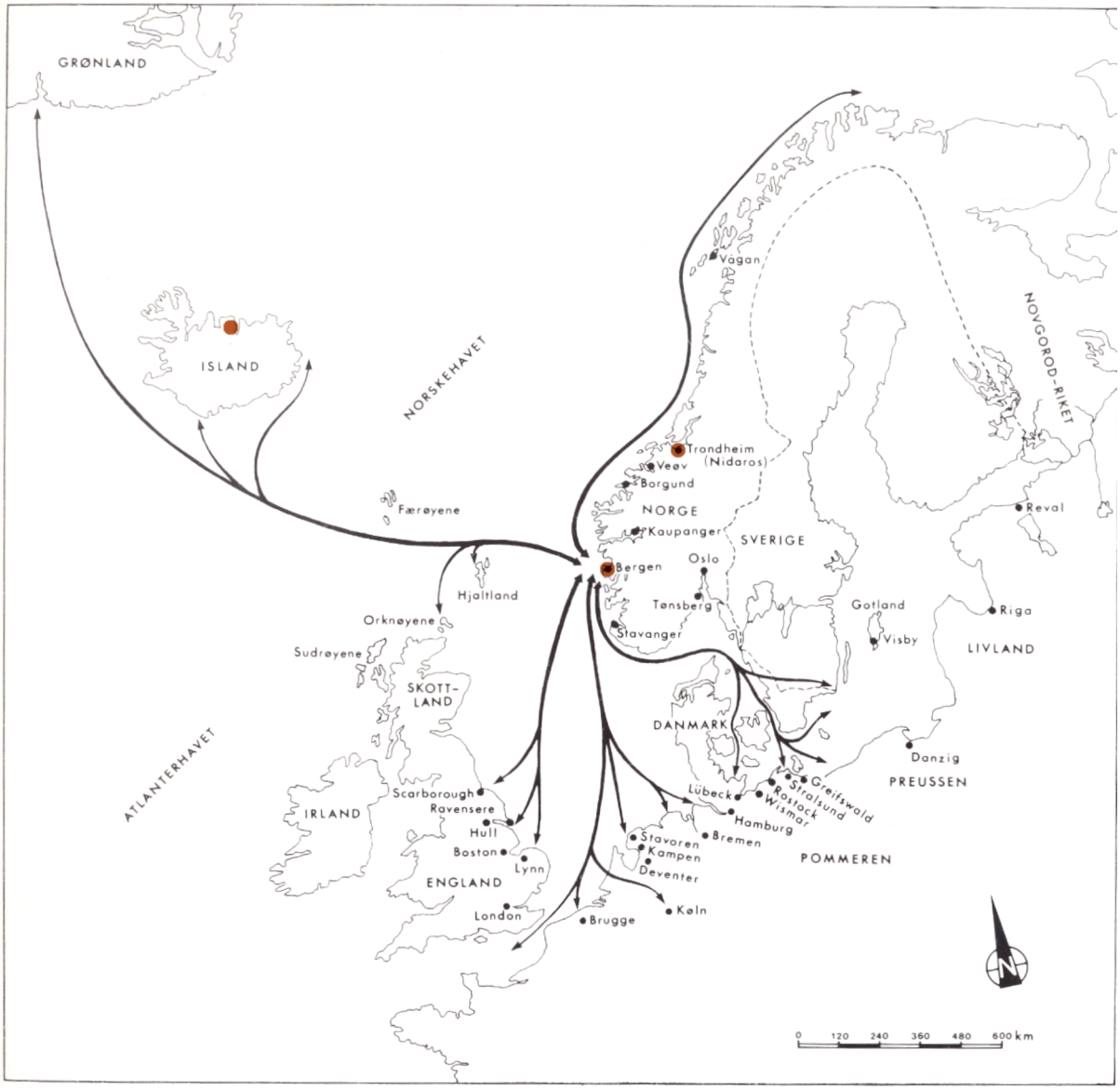


Figure 7: *Map showing the main trade routes of Bergen c. 1300 CE. Places dealt with in this thesis are marked in orange.*

2.3.2.2 Bergen archaeology

The Bergen material originates from a big area, central to both the historical and contemporary city of Bergen. The material is divided throughout different projects and locations, and executed over a large time span. The excavations of Bryggen and the Bryggen area can be divided into two. First was the *Bryggen project*. A continuous excavation of a fire area of Bryggen, carried out in the period of 1955-1968. Following came two Bryggen

peripheral excavations; one in 1972, and another in 1979, being Dreggen (Blackmore & Vince, 1994, pp.16-21; Herteig, 1969, pp.7-17; Hufthammer, 1994, p.213).

2.3.2.2.1 Bryggen

Area: Bergen, Norway
Location synonyms: Tyskebryggen, Hansabryggen, The German Wharf, The Hanseatic Wharf
Excavations conducted: 1955-1968
Area size: c. 4000m²

The Bryggen project became the first large-scale urban excavation in Norway. It covered an area in one of the oldest parts of Bergen (see **Appendix 2** for map of excavated area). Because of the enormous osteological material derived from the Bryggen excavation, analysis of the full collection was never conducted. The bone material of *Canis familiaris* of all Bryggen excavations conducted before 1973 was, though, thoroughly investigated by Anne Karin Hufthammer, and published in "The dog bones from Bryggen" (1994). On the basis of this, I will be referring to Hufthammer's publication directly, for work previously done on the Bryggen material (Blackmore & Vince, 1994, pp.16-21; Hansen, 2006, p.308; Hufthammer, 1994, p.213).

Bryggen chronology	
Periods	Time span
9	1955 - 1702
8	1702 - 1476
7	1476 - 1413
6	1413 - 1332
5	1332 - 1248
4	1248 - 1198
3	1198 - 1170

2	1170 - pre 1170
1	pre 1170

Table 3: *Bryggen project chronology. The division of periods represents fire layers. The periods marked in grey yielded no dog material. (Based on: Blackmore and Vince, 1994, Table 1, p.21; Hufthammer, 1994, Fig. 1, p.214). (Table by author).*

Hufthammers results can be found in the data chapter (ch. **5**), under subchapter **5.1.1.1**.

2.3.2.2.2 Dreggen

Area: Bergen, Norway
Location synonyms: Dreggsallmenningen, Dræggen
Excavations conducted: 1979
Area size: >640m²

Among the Bryggen peripheral excavations of 1973 and on, we have Dreggsallmenningen (see **Appendix 3** for excavated area). Per Undheim wrote "Osteologisk materiale fra Dreggen - En økologisk studie fra middelalderens Bergen" (1985) as his major, reporting on the osteological material from the Dreggen excavation (Undheim, 1985, p.i; Long & Marstrander, 1980).

Dreggen chronology		
Epoch	**Phase**	**Time span**
1	3 - 10	1170 - c. 1300
2	11	c. 1300 - 1332
3	12 - 15	1332 - 1527

Table 4: *Periodic divisions of the Dreggen material. Based on Undheim, 1985, p.5 and p.23. (Table by author).*

See data chapter (ch. **5**), subchapter **5.1.1.2** for Undheim's findings on dogs.

When it comes to later work done on the Bryggen area material, Skaar (2014) has included it in her study on Norwegian Medieval foodways, and Knoest (2015) has included it in his study on the morphology of Norwegian mediaeval dogs (see section *Norway Overall*, below).

2.3.3 Trondheim

2.3.3.1 Trondheim history

According to the sagas, Trondheim (then called *Nidaros*) was founded by king Olav Tryggvason under his reign (995-1000). The area of the Medieval town of Trondheim, situated on the Nidarnes peninsula, has been a place of importance for over a 1000 years. In the VA there seems to have been nothing but a sole farm situated on Nidarnes. There, however, rapidly emerged a town on the eastern side, after a "kaupang" was established there around 950 CE. Not before long, both a royal estate and religious centre were established on the peninsula as well (Cadamarteri et. al, 2020, pp.51-69; Ekroll, 2006; Sigurðsson, 1999, pp.88-89; Trondheim Kommune, 2016, pp.13-18).

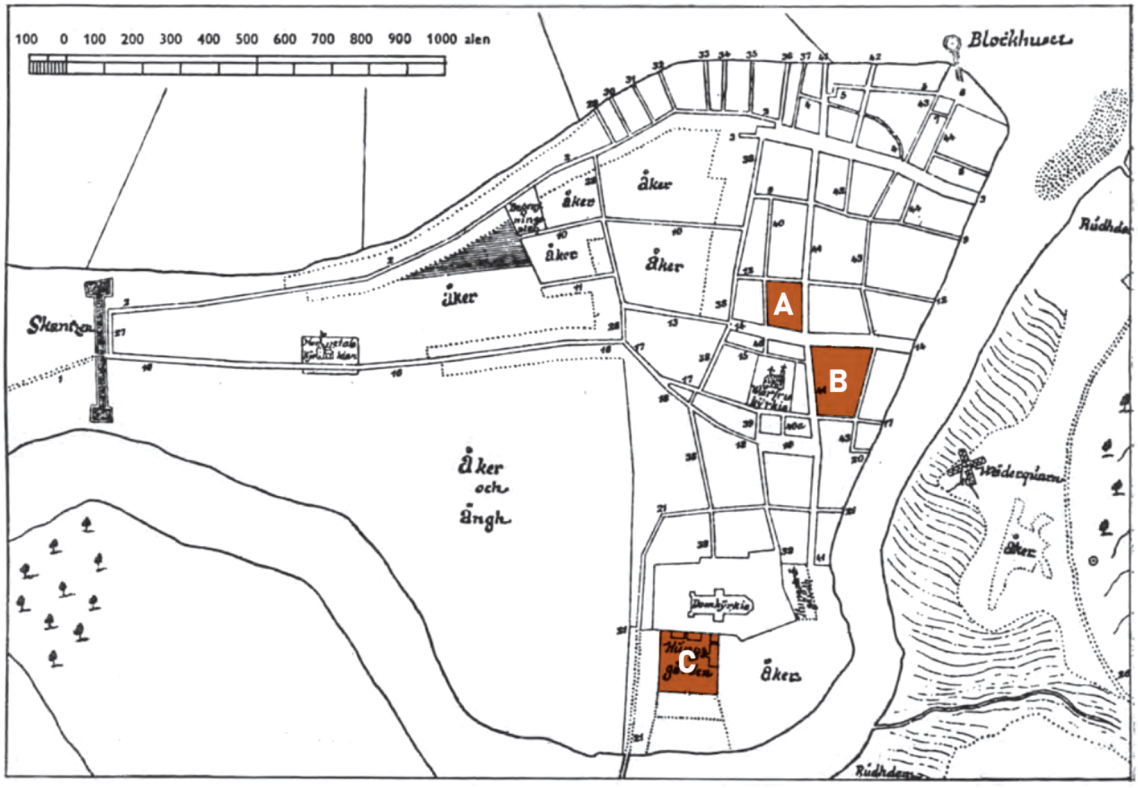


Figure 8: *One of the oldest known maps of Trondheim, by Olof Nauclér (1658). Coloured blocks show approximate areas including the excavated locations looked at in this study. A) Televerkstomten, B) Folkebibliotekstomten, C) Erkebispegården.*

The peninsula was an ideal location for a town with trade, as it had good harbouring conditions. It had two sheltered bays, just south of where the river feeds into the fjord. At the same time it became an important religious centre, with rumours of the late king Olav II Haraldson (d. 1030) (since known as *St. Olav*) having been buried somewhere on the peninsula in secrecy. In the MA Trondheim was involved in trade, and the goods for export were sold from waterfront buildings (NO: "sjøboder"), situated on the river east of town. Laws, like those regarding trade and docking of ships, were set in Magnus Lagabøte's City Laws of 1276. The mediaeval city was at its largest in the beginning of the 14th century, but the growth of the city halted with the arrival of the Black Death, around the middle of the century. At the reformation in 1537 the last archbishop of Nidaros fled the city, and thus the archbishopric of Trondheim came to an end (Ekroll, 2006, pp.77-83; Rosvold, 2022, n.p.; Sigurðsson, 1999, pp.112-113; Trondheim Kommune, 2016, pp.13-18).

2.3.3.2 Trondheim archaeology

The Trondheim material derives from three different sites within the historical part of the city, all on the Nidarnes peninsula. These sites were excavated between 1973 and 1995, and are part of the upsurge of urban excavations seen throughout Norway in the latter half of the 20th century. In contrast to the Bergen locations included in this study, the Trondheim locations are more dispersed throughout the MA town area.

2.3.3.2.1 Folkebibliotekstomten

Area: Trondheim, Norway
Location synonyms: FBT, Bibliotekstomten
Excavations conducted: 1973-1985
Area size: 700m² (of 3200m²)

The finds of FBT stem from a period from the end of the 900s and all the way up to modern day (see **Table 5** below). The osteological material from the project was analysed by Rolf W. Lie, and published as "Meddelelser nr.18: Dyr i byen - En osteologisk analyse" (1989). Lie writes that a total of 10-15 tons of animal bones were collected at the FBT site. Location wise, only material from the South-Western area of the site was chosen for analysis, where the preservation conditions had been good and some of the bone material had been systematically sieved out (map showing the selection of area, and the zones where dog bones were unearthed, can be found in **Appendix 4**). The selected area made up c. 700m² out of the total of c. 3200m² (Christophersen, 1985; Christophersen and Nordeide,1994, pp.13-17; Lie, 1989, pp.4-8).

FBT chronology	
Main phase	Absolute dating
1	900s
2	-1025
3	1025-1050
4	1050-1100
5	1100-1150
6	1150-1175
7	1175-1225
8	1225-1275
9	1275-1325
10	(1325-1500s)
11	1500s
12	1600-

Table 5: *Phases and dating of the Folkebibliotekstomten site. The dating of the site was based on different materials and techniques, like coins, pottery, and dendro-chronology. Bone material of phases 4-7 and 11-12 has not been analysed (Based on Christophersen and Nordeide,1994, p.35, table by Egil Horg). (Reproduction and translation by author).*

Time-wise, bone material from three of the early phases as well as three of the four later phases were chosen for analysis. Material from phases 4 through 7 was excluded, which means no bones from between c. 1050 - 1225 were included, nor material any later than c. 1500. This leaves us with bone material from phases 1-3 and 8-10 (Christophersen and Nordeide,1994, pp.30-32; Lie, 1989, pp.8-9).

For Lie's results on dogs, see data chapter (ch. **5**), subchapter **5.1.2.1**.

2.3.3.2.1.1 Bergland, 2014

Later on, Tone Bergland, in her master thesis in archaeology (2014, NTNU) "Dyr i Trondheims middelalder - Arkeologiske perspektiver på et osteologisk materiale", revisited the topic of animals in mediaeval Trondheim. She looked at mediaeval dog remains, amongst the other species present, from FBT as well as TVT. Bergland's main focus was to investigate the roles of the animals present, and to discuss aspects that might not be visible in the osteological material. She presented the number of dog remains alongside those of horses and cats. This as Bergland looked at how these three types of animals, that we today consider as "pets", compare (Bergland, 2014, p.vii; pp.65-66). See Berglands results on dogs in the data chapter (ch. **5**, subchapter **5.1.2.3)**.

2.3.3.2.2 Televerkstomten

Area: Trondheim, Norway
Location synonyms: TVT, *Televerket*, Nordre gate 1
Excavations conducted: 1977
Area size: 485m²

At TVT there were found traces of activity from 12 phases, ranging from c. 800-1681 CE (see **Appendix 5** for excavated area). The main rapport from the project is Jondell (n.d.) "Televerkstomten: et sentralt utkantområde i middelalderbyen: Rapport fra de arkeologiske undersøkelsene i 1977, Nordregate 1, Trondheim", which has been left both unfinished and unpublished (Marthinussen, 1992; NIKU, 2017; Arkiv - Vitenskapsmuseet - NTNU, personal communication, 17.10.2022).

The analysis of the bone material was carried out by Karin Lykkemeier Marthinussen. The results were published as the thesis for her major in zoology, under the title "Et osteologisk materiale fra Televerkstomten" (1992). The osteological material she analysed was collected from the areas of the site named VA, VB, VC, and VD (as the initial report on TVT never was finished, and Marthinussen didn't include one either, I have unfortunately not been able to find a map that shows this division of the site). Marthinussen grouped the 12 phases of the site into four epochs (see **Table 6** below)(Marthinussen, 1992, pp.1-5). See Marthinussen's results on dogs in the data chapter (ch. **5**), subchapter **5.1.2.2**.

Televerkstomten chronology	
Epoch (Marthinussen)	**Phase**
Epoch 1 (c. 900-1150) Late VA / early MA	**1** c.900-1050
	2 (2a, 2b) c. 1050-1100
	3 c. 1100-1150
Epoch 2 (c. 1150-1350) High MA	**4** (4a, 4b) c. 1150-1250
	5 c. 1250-1300
	6 c. 1300-1350
Epoch 3 (c.1350-1580/1600) Late MA	**7** (7a, 7b, 7c) c. 1350-1580
Epoch 4 (c. 1580/1600-1850/1900) Recent time	**8** (8a, 8b, 8c) c. 1580-1700
	9 c. 1700-1900
	10
	11

	12

Table 6: *Periodic divisions of the TVT site. VA = Viking Age. MA = Medieval Age. Based on Marthinussen, 1992 (Table by author).*

When it comes to work done since Marthinussen's report, Bergland's thesis (2014, mentioned above for FBT) is relevant also for TVT. This as most of Bergland's conclusions regarding dogs are based on both the FBT and TVT material, as a representation of the situation in MA Trondheim.

2.3.3.2.3 Erkebispegården

Area: Trondheim, Norway
Location synonyms: EBG, *The Archbishop's Palace*
Excavations conducted: 1991-1995
Area size: 2200m²

The archaeological site of Erkebispegården, composed of an eastern and a southern wing, was divided into ten areas (named A through I, and K. See **Appendix 6** for site maps). From the east wing area, there were found almost no traces of activity from before c. 1500 CE. While from the south wing one found traces of activity from all the way back to around the year 1000 CE. The material from the site was divided into 12 periods (see **table 7** below). Further subdivisions were also used; phases and groups (Hufthammer, 1999; Nordeide, 2000).

Erkebispegården chronology			
Period	Site development	Timespan, rough	Timespan, detailed, CE
1	Occupation, farmstead	10th to early 11th cent.	968 - 1038
2	Soil horizon, occupation	11th and the first half of 12th cent.	1038 - c. 1152/53
3	Archbishop's palace	Mid 12th to mid 13th	c. 1152/53 - c. 1250

		cent.	
4	Archbishop's palace	Mid 13th to late 15th cent.	c. 1250 - c.1475
5	Archbishop's palace	Late 15th to start of 16th cent.	c. 1475 - 1500
6	Archbishop's palace	Early 16th cent.	1500 - 1532
7	Archbishop's palace decline, Lensherre's precinct establishment	Early to late 16th cent.	1532 - c. 1590
8	Lensherre's precinct	Late 16th to early/mid 17th cent.	c. 1590 - 1640
9	Lensherre's precinct	Early/mid 17th - mid/late 17th cent.	1640 - 1672
10	Stiftamtmann's precinct	Mid/late 17th - the start of 18th cent.	1672 - c. 1700
11	Military precinct	Start of 18th - late 18th cent.	c. 1700 - c. 1780
12	Military precinct	Late 18th cent. - modern-day	c. 1780 - 1991

Table 7: *Table showing the periods of EBG. Based on Nordeide, 2000 (Table by author).*

The osteological material was analysed as early as in 1991 and 1992, years before the excavation of the entire site was completed. Categorization and identification were mainly carried out by Agnes Hansen and Anne Karin Hufthammer, together with the help of others at the osteological department at UiB University Museum. The analysis of the material was carried out by Hufthammer, and she published her findings in *NIKU Temahefte 17*: "Kosthold og erverv i Erkebispegården - En osteologisk analyse" (1999). There, Hufthammer solely reports on areas A and B of the site (at the East wing); which represents the two areas first excavated. The osteological material from EBG area A and B was mainly collected by hand, and no sifting was conducted this early on in the project. See **Appendix 6** for maps of the excavation site and areas of Canis fam. finds (Hufthammer, 1999, p.3; p.9).

An important note is made already in the preface of the article. It states that in the first year of the project, the methods and techniques used in regard to the collection and registration of the osteological material, were not set. They had to develop the methods along the way, something that makes them refer to the first year as a trial round. Despite this, the decision to use the osteological material from the first year of the project to do this report, was made. Hufthammer mentions how it would be more ideal to report on material from later on in the project, but to my knowledge this has yet to be done (Hufthammer, 1999, p.3).

See the results of this study, in regards to dogs, under **Chapter 5**, subchapter **5.1.2.4**.

2.3.4 Norway overall

Throughout time, the dog of Medieval Norway has not gotten a lot of focus. In the 20th century, only two bigger studies were done on the topic; Brinkmann ([1920], in: Knoest, 2015) *Canidenstudien*, and Hufthammer (1994) *The Dog Bones of Bryggen* (the latter discussed in the *Bryggen* section above). Since then, more studies have been carried out. Some studies focused on animals of the period, some on dogs, some on foodways, and some looking at the material of MA towns of Norway altogether.

2.3.4.1 Skaar, 2014

A contribution to the topic of MA urban zooarchaeology is Rebekka A. Skaar's (2014) master thesis in history, on the foodways of Medieval Norway. Especially relevant to my study is the part where she discusses meat consumption and food taboos. She included zoo-archaeological material from all three of my selected Trondheim locations, as well as Bryggen in Bergen (among others) (Skaar, 2014, p.11). See Skaar's results regarding dogs in the data chapter (ch. **5**), subchapter **5.1.3.1**.

2.3.4.2 Knoest, 2015

Another contribution to the topic is Jorg J.T. Knoest. He wrote a master's thesis in biology titled "On the morphology of the domesticated dog in mediaeval Norway - An osteometric study" (2015, UiB). Knoest performed morphometric analysis on 778 dog bones from 28 different urban MA locations in Norway. Among these were locations in Bergen and Trondheim; Bryggen, TVT, FBT, and EBG (Knoest, 2015, pp.1-5).

Knoest's main goal was to create an insight into what the dogs of mediaeval Norway looked like. His results can be found in **chapter 5**, subchapter **5.1.3.2**.

2.3.5 Iceland

Iceland was settled in the VA, becoming its own state. This when mainly Norwegians, but also Celts and others of North-European origin (mainly from the British isles), came to settle down on the island. Initially, the society on Iceland mainly consisted of farms. Even far into the Mediaeval Era, there were still no big towns nor similar big centres on the island, and the largest settlements were the trade ports and church centres. Whether or not the Icelandic farms of this era were self-sufficient is still under discussion, and thus how far they were reliant on trade from abroad (Bjørlo, 2010, pp.1-3; Harrison et. al, 2008, pp.99-100; Sigurðsson, 2014, pp.67-69; Stefánsson, 1986, pp. 70-87; Traustadóttir, 2018, pp.123-125).

The commodities the Icelanders acquired through trade were things like luxury items, weapons, and timber. As a fast-growing community, commerce became a necessity. And being a feudal society, including higher-standing individuals such as chieftains and people of the church (e.g. the bishops), luxury items were needed for these to distinguish themselves from the rest. The need for such goods increased as church taxes were established in the year of 1096/97 CE. As for export, items like wadmal (NO: *vadmel*, a wool product) hides, fur, falcons, and sulphur were among the most important (Carter, 2015, pp.1-27; Sigurðsson, 2014, pp.67-69; Stefánsson, 1986, pp.70-87; Traustadóttir, 2018, pp.123-125).

By c. 1240 all trade on Iceland had been taken over by Norwegian traders. In 1262 the free state of Iceland fell, and through the years of 1262-1264 it was underlain the Norwegian king and commonwealth (thus becoming a "skattland", a taxed state, of Norway). This made the contact between the two states even stronger, politically, economically, and culturally. Both traders, as well as men of the king, and men of the church would frequently sail from Norway to Iceland for business. These travels at sea were nevertheless not without consequences, and many ships sailing between the two states are reported to have sunk before reaching their goal. By the end of the 14th century the trade between Norway and Iceland strongly decreased. Through the two first decades of the 15th century Norway's trade with Iceland was replaced with trade with England. And from this time on, few to no ships sailed between

Norway and Iceland (Bjørlo, 2010, pp.1-3; pp.13-16; Harrison et. al, 2008, pp.102; Stefánsson, 1986, pp. 70-87).

The Black plague was also to arrive in Iceland, as it did in Norway, and by 1402-1404 half the island's population had died as a consequence. Later on, in 1536, the church reformation was to create a huge wave of change throughout Northern Europe and the Nordic states. At this point Iceland was underlain the Danish crown, as was Norway (Giverholt et. al, n.d.; Rasmussen, n.d.; Stefánsson, 1986, pp. 70-87).

2.3.5.1 Iceland archaeology

Before the early 2000s there had not been much work done on Viking age and Mediaeval harbours and trading ports in Iceland in regards to archeological research. In Iceland, coastal erosion, which will wash archaeological coastal sites out to sea, is a pressing matter. Thus, carrying out excavation projects at coastal sites, like those of Kolkuós (2002-2012) and Gásir (2001-2006), is of great importance (Roberts, 2006; Traustadóttir, 2018; Zoëga, 2021).

When it comes to animals, Iceland is known to have had a strong culture surrounding horses. This is visible e.g. through Viking Age grave goods on the island, where horses are strongly represented as of animals found buried alongside humans. Dogs, too, are found buried alongside humans in prehistoric Iceland. This in both simple as well as in rich graves. Animals given a proper burial, e.g. alongside humans, and thus not being discarded as common waste, are believed to have had a certain value to their owner(s). These types of animals might just as well have held a high status throughout the MA too, even though it would not be visible as grave goods anymore (because of the transition to Christian burials) (Bjørlo, 2010, pp.53-62; Gutierrez, 2017, pp.35-43).

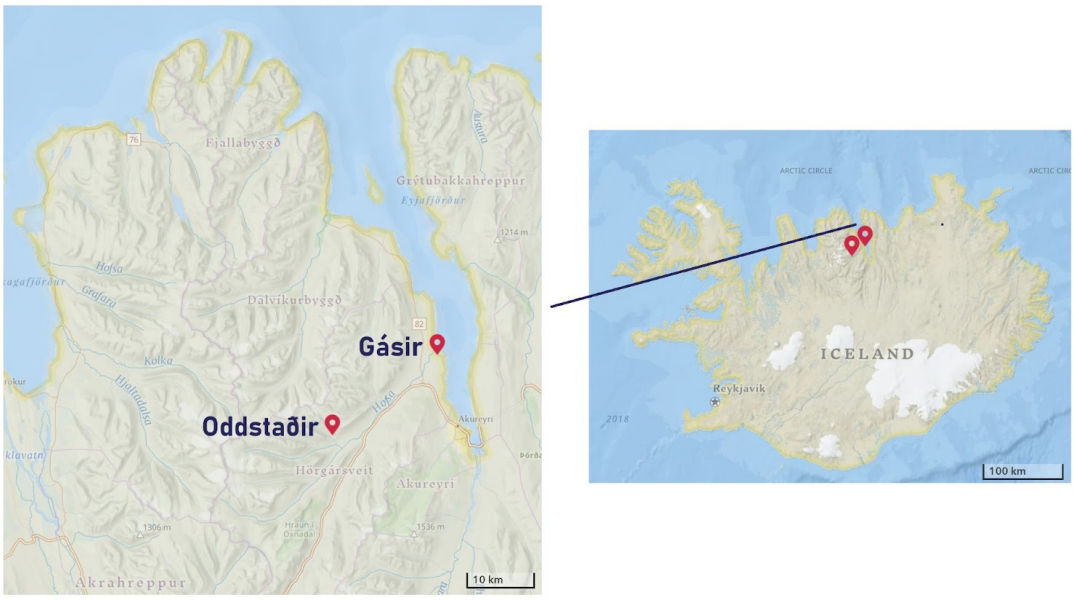


Figure 9: *Maps showing where in Iceland, as well as where in the Eyjafjörður area, the two Icelandic locations are at.*

2.3.5.2 Eyjafjörður

2.3.5.2.1 Gásir history

To allow trade from afar, trading places with good harbours were a must. One of these trade ports was Gásir (IS: *Gásar*). The seasonal trade port of Gásir was located towards the inner end of the Eyjafjörður fjord. It lied on a bank on the fjord's western side, approximately 43 km south of the fjord's mouth to the Atlantic Ocean. Another geographical feature of the location is that it sits at the bottom of the Hörgardálur valley, which comes in from the southwest. It is in this valley the contemporary farm of Oddstaðir was located (Christophersen & Dybdahl, 1999, pp.9-36; Fornleifastofnun Íslands, 2002, p.2; Harrison et. al, 2008, p.99-100; Traustadóttir, 2018, p.125).

The earliest account of Gásir market activity, at 1163 CE, is found in *Preststssaga Guðmundar góða*. The seasonal market might still have been established as early as in the VA (Harrison et. al, 2008, p.103). According to Stefánsson (1986), Gásir was the most important trading port of MA northern Iceland. Harrison et. al (2008) agrees that Gásir was at least among the

largest seasonal trade centres of the island in said period. Gásir is thought to have been an important point of both trade and cultural contact, international as well as local. Both literary sources as well as archaeological material witness of trade of both luxury goods (e.g. gyrfalcons, and walrus ivory), and bulk goods (e.g. wool, sulphur, and stock fish) (Harrison et. al, 2008, pp.99-103; Stefánsson, 1986, pp.70-87).

Both the presence of luxury items for trade, as well as high-end foods (like prime-age cattle and caprines) witness of some prestige at the Icelandic trade port. Literary sources also witness of contact between Gásir and higher-standing individuals of the surrounding area, like the monks at the Möðruvellir monastery. Due to silting up of the harbour area and very likely also changes in political organisation, the activity at Gásir nevertheless seems to have come to an end around 1400 CE. This as both literary sources about the market's activity cease to exist, and the dating of the youngest archaeological material falls around this point in time (Harrison et. al, 2008, p.103; pp.106-115).

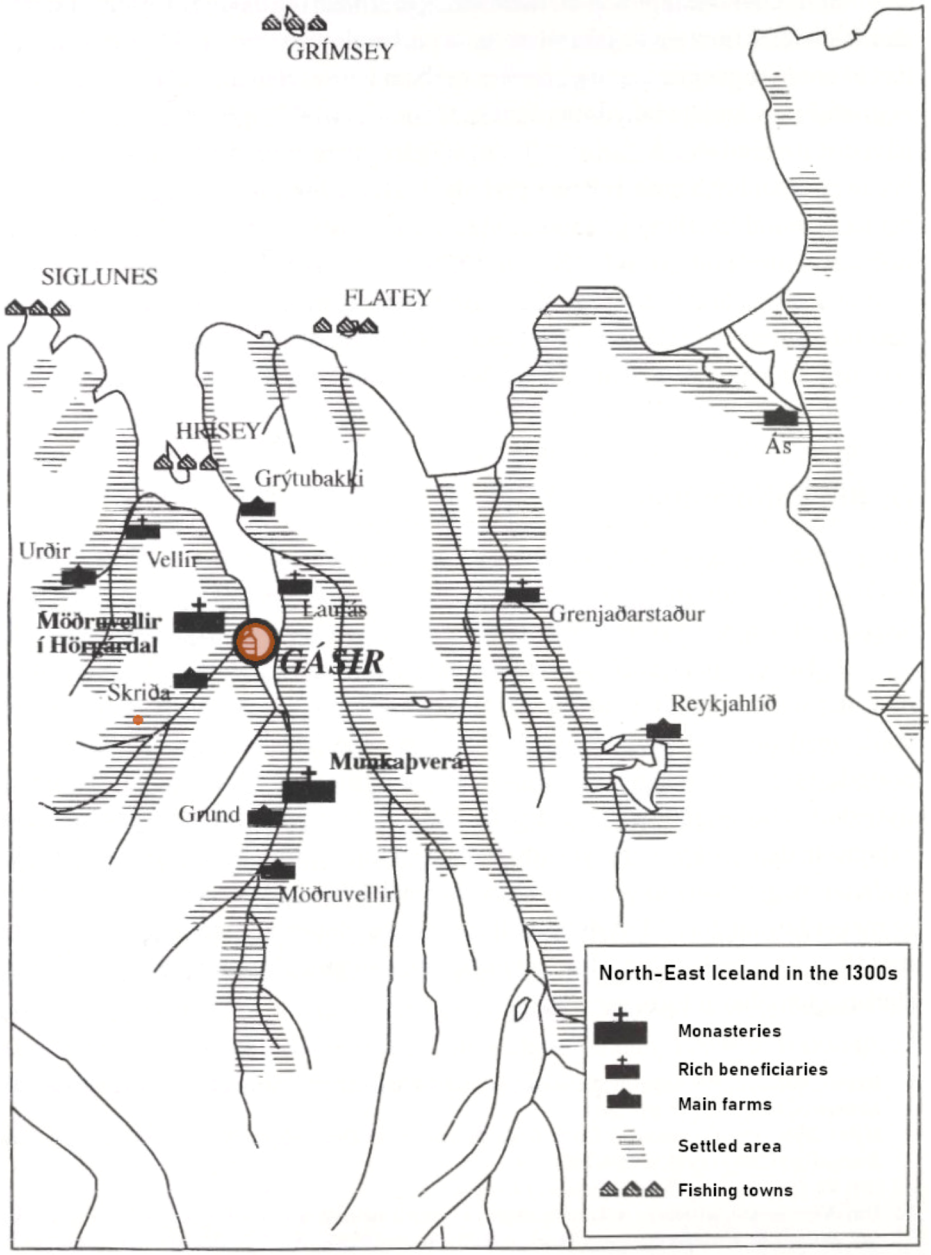


Figure 10: *Map showing known settlements (as of 1999) in the area of Eyjafjörður in the 1300s. The area of Gásir is encircled and coloured orange, and the approximate location of Oddstaðir is coloured in orange.*

2.3.5.2.2 Gásir

Area: Eyjafjörður, Iceland

Location synonyms: GÁS, Gásar
Excavations conducted: (1907, 1986) 2001-2006
Area size: c. 600m² (of 1170m²)

The first excavations at Gásir took place as early as in 1907. Later, four test pits were excavated in 1986. For the sake of this thesis, only material yielded from the latest excavation project (2001-2006) will be included (Christophersen & Dybdahl, 1999, pp.9-36; Fornleifastofnun Íslands, 2002, p.2; Harrison et al., 2008, p.99; Roberts, 2006, p.7).

The most recent excavations at Gásir were carried out from 2001 to 2006. This as part of a collaborative effort by the North Atlantic Biocultural Organization [NABO]. The focus of these excavations was the layers above the ca. 1300 CE volcanic tephra layer (and thus, older layers remain uninspected). The excavated areas were named A through F. The zooarchaeological material dealt with in this thesis derives from area A, consistent of interlinked sunken-feature buildings or booths and open activity areas (see **Appendix 7** for excavated areas). For the bone material collected, the analyses were conducted by Ramona Harrison and her colleagues, at Northern Science and Education Center [NORSEC]. This with Jim Woollett analysing the 2002 archaeofauna, and Woollett and Seth Brewington contributing to the 2003 archaeofauna (Harrison et. al, 2008, pp.100-103; Harrison, 2009, p.2; Roberts, 2006).

Gásir dating			
Source type	What/Where	Information	Dating (CE)
Historical, written	*Prestssaga Guðmundar góða*	First mention of Gásir market activities	1163
Tephra layer	*Grímsvötn*	Volcanic horizon	ca. 1300
C13	Zooarchaeological remains	Cattle bones	ca. 1155-1355
Artefacts	Ceramics	Pottery assemblage	ca. 1200-1400
Historical, written	*Gottskalks Annaler (P) 1390-1392*	Last mention of Gásir seasonal	1391

		market	
Scientific article	*Adderley et. al, 2008*	Assumed end of market activity	ca. 1400

Table 8: *Gásir dating, based on some of the different source types available (Harrison et. al, 2008, p.103; Storm, 1888, p.367). (Table by author).*

As for periodic divisions, most of the Gásir material stems from the 14th century. This on the basis of the excavation strategy used:

"The overall open-area excavation strategy aimed at recovering a broad synchronic picture of conditions on the site in its later phases (14th to possibly early 15th century), expanding in phase over a wider area rather than producing a narrow deep multiphase pit; the artifacts and ecofacts collected are thus all from the same broad time period."

- Harrison et. al, 2008, p.100

The Gásir Area A archaeofauna was reported on in Harrison (2009) "NORSEC Zooarchaeology Laboratory REPORT No. 44". Some of the animals identified were noted as more unusual than the rest. Among these were both average as well as some lap-dog-sized dogs. There were about 15 fragments of dog bones in total, with an estimated MNI of 11 (pp.2-4).

2.3.5.2.2.1 Harrison et. al, 2008

In the publication of "Gásir in Eyjafjörður - International Exchange and Local Economy in Medieval Iceland" (Harrison et. al, 2008), other aspects of the dog findings at Gásir are mentioned. This is one of the papers that resulted from the Gásir 2001-2006 project. Harrison was also one of the participants to this paper, and it was published a year prior to her zooarchaeology report. Aspects of the dog findings at Gásir mentioned in Harrison et. al 2008 but not in Harrison 2009, can be found in **chapter 5**, subchapter **5.1.4.1**, following the Gásir zooarchaeology report data.

2.3.5.2.3 Oddstaðir history

Oddstaðir was a farm in Iceland, located far up the Hörgárdalur valley. The farm is estimated to have been active from the late 9th to the late 14th century CE. Today there is nothing but the ruins of the farm left at the location. The ruins lay on the Northern side of the Hörgá river. The river runs in a West-East direction, from the inner part of the valley, throughout the bottom of the valley, until finally running out into the Eyjafjörður fjord, just north of Gásir. Oddstaðir is thought to might have been a tenant farm under Oxnholl, but this remains unclear. By the evidence yielded, the farm seems to have been of neither high nor low status (Harrison, 2012, pp.3-7).

For Oddstaðir there are no known accounts of the farm in historical sources. This makes the historical backdrop for the farm the same as for the rest of the settlements in the area.

2.3.5.2.4 Oddstaðir

Area: Eyjafjörður, Iceland
Location synonyms: ODD, ODÖ
Excavations conducted: 2008-2009
Area size: 8m²

Oddstaðir chronology		
Phase	**Period**	**Dates**
1	Viking Age	ca. late 9th century
2	Viking Age	late 9th - mid 11th c.
3	Late VA - Early MA	mid 11th - mid 12th c.
4	High MA	mid 12th - ca. late 13th c.
5	Late MA	late 13th - late 14th c.

Table 9: *Phases of Oddstaðir occupation. Based on Harrison 2012, p.13, tbl. 1 (Table by author).*

A trench covering a midden at Oddstaðir was excavated in 2009, as part of the Gásir Hinterlands Project, in connection to NABO (see **Appendix 8** for excavated area). The material excavated was analysed at NORSEC, and a report on the archaeofauna was produced by Ramona Harrison, and published in 2012 (Harrison, 2010, pp.24-28; Harrison, 2012, pp.3-22).

3. Theoretical Approach

3.1 Archaeological theory

Archaeological theory is the framework in which we can ask questions of our material. In this chapter, I will discuss the theoretical approaches considered throughout this thesis. As briefly mentioned in the introduction, this study will be a mainly zooarchaeological study. A study of animal bones, with the aim to reveal something about the human past. Using methods borrowed from the natural sciences, I will avoid the main criticism the New Archaeology movement had towards the precursor of culture-historical archaeology (being largely interpretative)(Johnson, 2010, pp.12-21).

I will be using methods from traditional archaeology as well, by looking at literary sources contemporary to my material. The method of looking at contemporary literature to get a better understanding of the past has kept its popularity in fields like Classical, Medieval, and modern archaeology. The use of contemporary literary sources to study the human past does, however, not go without challenges. As these texts were written in a different time period than our own, other meanings and values than what we have today could have been given words and phrases used. Contemporary literature can however be of great value as long as one treads carefully - much like in interpreting archaeological objects (Johnson, 2010, pp.15-21; pp.185-198; Solberg, 2003, pp.16-27).

There are many types of archaeological movements and theoretical approaches one could use for a study like this. What seems like a reasonable approach to any archaeological topic would be the idea of the historians of the Annales school movement, who strive to include information on all aspects of past societies (Johnson, 2010, pp.185-198). To achieve this, perhaps one should not necessarily choose some approaches and methods over others, but rather see how much information one can possibly collect using a variety of them. Still, obtaining all knowledge about a topic would be near impossible for one person to achieve. Thus one needs to keep building on already existent knowledge.

3.2 Zooarchaeological theory

As for animal studies in archaeology, there has been a shift going from the view of animals being seen as mere objects (to be hunted, domesticated, and consumed) to a view of animals as subjects. This more recent approach to human-animal relations of the past (with roots in the 1990s) aims to look further than the purely utilitarian perspective and instead view animals as an integral part of society (as e.g. symbols, sacrifices, and companions). This approach stands particularly strong in the study of hunter-gatherer and other non-capitalist societies, where most animals interacted with were not "owned" by anyone. In such societies, animals could play key roles in myth, cosmology, kin relations, and social organisation. In some cases, certain animals would even be viewed as a different type of human embodiment (Hill, 2013, pp.117-120).

Some claim one can see a shift in how humans saw animals in going from being hunter-gatherers to farmers (e.g. [Nadasdy, 2007; Orton, 2010; Puputti, 2008], in Hill, 2013). This as domesticated animals would belong to someone, making them an "object" owned by human members of society, and thus being reduced to part of the economy (Hill, 2013, pp.117-120). As my study is on dogs, domesticates, from largely capital "Western" societies, the non-utilitarian view on human-animal interactions might not be quite as fragrant in this case. I believe it is still important to keep in mind that animals, as today, could have had both object and subject-oriented roles in society, and animals within the same society could also be viewed and treated differently from each other, as well as human individuals of the same society could be treating animals differently from one another (Hill, 2013, p.120). This means that even though we are going to look at the case of dogs of mediaeval western societies, we are probably still not dealing with animals in a purely objective role, but rather as something in between or as a mix of the two.

3.3 Symmetrical archaeology

For the purpose of this study I have decided to look at the data through the actor-network theory [ANT], a theory related to the "symmetrical archaeology" movement. Symmetrical

archaeology was developed by Bjørnar Olsen, and emphasises on giving the different elements of archaeological material equilibrium in our interpretation of the different factors that made up for decisions and events of the human past. The idea is that not everything relies solely on human action, and that the likes of environment, weather conditions, and animals are due credit too. This movement is a means of stepping away from the duality of human-nonhuman, cultural-non cultural divisions previously seen in the analysis of social and behavioural sciences, and to rather look at it all as a large web of factors (or *actors*) all affecting each other (Olsen, 2010, pp.13-23; pp.124-125; Preucel, n.d., pp.8-13; Wright, 2015).

3.4 Actor-network theory

The actor-network theory [ANT] was first presented by Bruno Latour, Michael Callon, and John Law in the field of science and technology studies, in the 1980s. Its focus lies in not analysing single objects (actors) by themselves, but to also look at the network that connects them all. The theory, as the inspiration to the development of the symmetrical archaeology idea, was taken in use in social studies (including archaeology and zooarchaeology) to be able to go a step further in analysing factors of society (Lucas, 2012, pp.157-168; 188-198; 258-265; Preucel, n.d., pp.1-8).

Using the ANT in this study would mean looking into what role the dogs (here being the actors under investigation) played in their respective societies (networks). Using this theory to study the dog material, we can approach the question of what role they played in society, as well as how they are linked to other actors of the past. In the case of archaeology, the results should include information on how these actors and networks connected to and affected the humans of the past.

4. Methods

Here I will present the different methods used for extracting data from my material selection; the ways in which I have examined the bones as well as ways of reading and understanding the findings. This chapter solely discusses the methods themselves, and my data and results from data analysis will be presented in the next chapter.

4.1 Collection

Collection, in this case, archaeofaunal recovery, is the gathering and collection of the archaeological material uncovered at an excavation. Collection is not part of the work I have conducted for this study, but the methods of collection used are quite important to consider. This as both collection methods and selections will greatly affect what and how much material one is left with to analyse. My selected material was collected, not only in two different countries, but at excavations throughout the time span of 54 years (1955-2009). Thus a great variation in methods and selections is likely to have occurred. (Marthinussen, p.74; Reitz & Wing, 2008, pp.117-152; Undheim, 1985, p.9; Wiig, 1981, pp.38-39).

4.2 Identification

4.2.1 Initial identification

When dealing with the collected bone material from an archaeological site, after determining it is in fact bone, one will have to identify which animal it derives from. Depending on the preservation status and wholeness of the pieces of bone, they will be identified to family, as well as genus and then species as far as possible. The smaller, unidentifiable pieces, will normally be measured collectively by weight.

For the purpose of this thesis, I have only dealt with the identifiable pieces from the chosen locations. It is, however, important to understand that the bones identified down to genus and species will in most cases only represent a very fractional number of the true total, and that

there in reality probably have existed quite a bit more individuals in the given time and space. See below for more on the number of individuals (Reitz & Wiig, 2008, pp.117-152).

All my material was already classified as *Canis familiaris* (at the point of initial zoosteological analyses), and for the purpose of this study I have worked with the assumption that all the material was correctly identified as such.

4.2.2 Skeletal element identification

Part of the identification work is figuring out which skeletal elements one is dealing with. The more fragmented and eroded the bone material is the harder this task is. Analytical manuals (e.g. Hillson, 2009), illustrations, pictures, and comparative collections are helpful tools in identifying elements. Below one can see an illustration of a dog skeleton (Pálsdóttir & Smith, 2019) with the main skeletal elements of a dog labelled by their English names (**Figure 11**). For smaller bones, and bones that are similar to others, more in-detail illustrations can be useful.

In the work with skeletal elements, I have used the NABONE recording system codes (See **Appendix 1**). They are a set of abbreviations, or codes, used as identicators for which part of the animal (in this case mammal) one is dealing with. This recording system was created by the North Atlantic Biocultural Organization Zooarchaeology Working Group (NABONE, 2008, pp.5-6).

Except for the Bryggen material, I have identified all dog bone material derived from the chosen sites, down to skeletal element (as far as possible), including which side of the skeleton it derived from (left/*sinistra* or right/*dextra* half). Afterwards, I compared my results to those already registered in the database of the UiB university museum. Most of my findings corresponded with what was already registered, and only a handful of minor mistakes were found in the database, and then corrected (after forwarding my results to the chief engineer of the osteological laboratory; Olaug F. Bratbak).

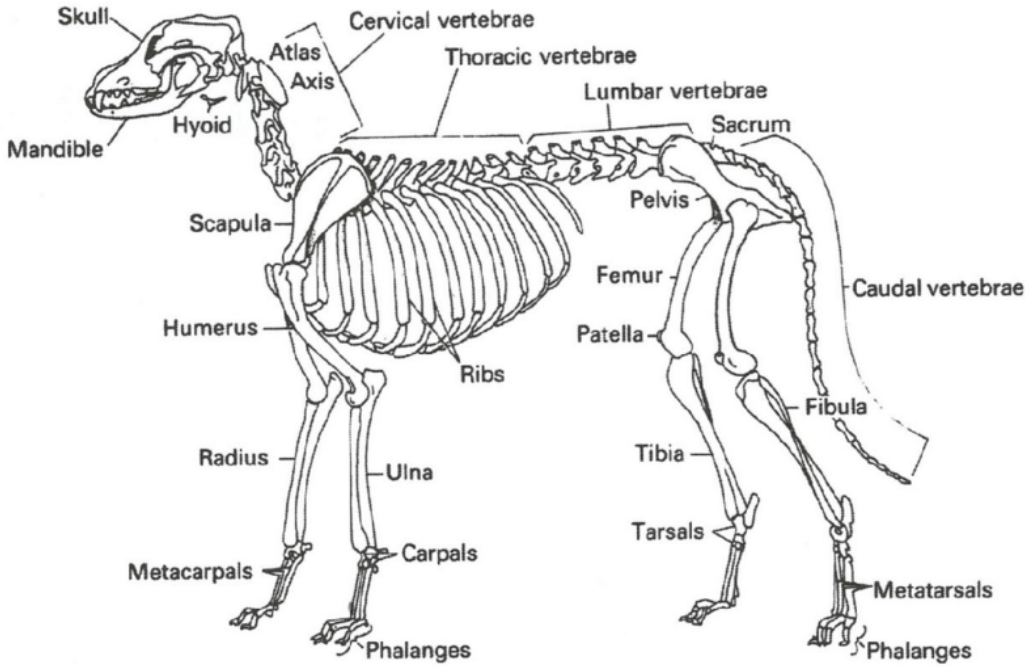


Figure 11: *Dog skeleton with main elements labelled.*

4.2.3 Physical comparison

"one cannot identify or understand an object never before seen without comparing it to a known object"

- *Peregrine & Smith, 2012*

In addition to determining the species and bone elements one is dealing with, the comparisons of the archaeological bone material to that of modern bone assemblies can be used for a variety of analyses. Bones that for one reason or another it is hard to determine the original size of the dog from (for instance for individuals where there are no complete long bones present), one can look at in comparison to the skeletal elements of individuals of known size. This is a method I have used on some of the subfossil elements in my selection, especially with very small and very large elements. See **Appendix 9** for a full overview of comparative individuals used in regard to this method (O'Connor, 2000, pp.36-53; Peregrine & Smith, 2012, p.4; Reitz & Wing, 2008, pp.161-168).

In addition to comparative bones of dogs of known modern breeds (in which we know approximate sizes), I also compared the elements in question to those of modern foxes (*Vulpes vulpes*) and wolves (*Canis lupus*) - two canid species in which the morphology varies far less than that of the dog. This will be able to tell us whether we are dealing with a small dog (approximately the size of a fox) or a very large dog (approximately the size of a wolf). This method does not give a precise size estimate for the material, but will rather place the individual in a size category (Wallis, 2019, pp.1-15).

4.2.4 Number of individuals

See **Terminology** (subchapter **1.4**) for explanations on NISP and MNI.

When counting fragments (NISP), I counted each piece of bone as one fragment, even when it was highly likely to stem from the same skeletal element as other pieces from the collection. Teeth sitting in a skull or mandible have not been counted in addition to the element in which it was sitting. Loose teeth would each be counted as singular fragments. My MNI is based on the look and fit of the bones solely, and the immediate context and find locations within the excavated areas has not been looked into further than registration number and find-ID.

When comparing my number of fragments (NISP) to those who have previously analysed the same material, the numbers don't always match up. There are probably several reasons for this. One being different ways of counting fragments, and another being fragments possibly getting re-classified at a later stage. For my chosen collection, some elements were also lent out to the museum connected to the osteological department of UiB (the University Museum of Bergen), and thus not currently available for me to analyse.

4.3 Size

4.3.1 Height reconstruction

The size (height) of a dog can potentially tell us more about what kind of work people kept and used them for. For those individuals where the complete length of a long bone is

preserved it is possible to do a height reconstruction. This is done through the measurement of the great length (GL) of the bone, and then re-calculating this number into the approximate height of the individual (measured at the withers/shoulders). When applying this method to the material, I used the GL measurements as those of Prof. Dr. Angela von den Driesch (1976), and the re-calculation formulas of Harcourt (1974) (see **Table 10** below).

Shoulder height reconstruction calculations - as by Harcourt (1974)			
Humerus	(3,43 x GL) - 26,54	Ulna	(2,78 x GL) + 6,21
Radius	(3,18 x GL) + 19,51	Femur	(3,14 x GL) - 12,96
Tibia	(2,92 x GL) + 9,41		

Table 10: *Shoulder height recalculation formulas, from long bone GL. Based on Harcourt (1974, p.154). (Table by author).*

4.3.2 Dog size groups

The size categories used are based on recorded sizes of the *Canis familiaris* species, as well as previously used categories and types. The recorded size range in dogs is represented by shoulder heights of 6,3-106,7 cm and weights of 0,1-155,6 kg (with sexual dimorphism, with males being larger than females, in some breeds)(Wallis, 2019, p.5). This reflects the fact that dogs are the animal with the widest range of morphological differences within a species in existence (Reitz & Wing, 2008, p.287-288; Wallis, 2019, p.5). I divided the total range in dog shoulder heights into three categories, to be able to better understand and explain what sizes, and potentially types, of dogs we are dealing with.

- Small: Also sometimes referred to as “lap-dog”, and at times compared to the size of foxes. Included are the “knähund” from historical sources (so small that a man’s fingers could meet around its neck), and “skjødehund” (which could fit in one’s lap, also referred to as “companion dogs” or “miniature dogs”) from modern Norwegian sources. Another example of the small dog category is “earth dogs” (also called “terriers”), used for hunting and pest control of animals underground. The dogs of this size category are all-in-all dogs of smaller size, approximately within the range of

6-40 cm shoulder height (Hufthammer, 1994, pp.218-231; Løberg, 2017, n.p.; O'Conor, 2001, pp.13-17; Simonsson, 2006, pp.11-12).

- Medium: Also at times referred to as normal or average-sized dogs. A dog of medium size; not too small, neither too big. Examples that would likely belong to this size category are the "mjåhund" (meaning "slender dog") as well as other types of hunting dogs mentioned in historical sources. Among them are dogs of the "dyrehund" (Norwegian Buhund) type. The medium categorised dogs have shoulder heights within the range of **40-73 cm** (Hufthammer, 1994, pp.218-231; Ordbøkene, n.d.; Simonsson, 2006, pp.11-12).

- Large: Big specimen, sometimes as large as, or even larger than, the average grey wolf. Examples of dogs from historical sources likely to fit in this category would be the "vallhund", "butchers' dogs", the Irish "árchú", and the Mastiff-like guard dogs known to e.g. have been used in London. A dog at a shoulder height approximately within the range of **73-107 cm** (Hufthammer, 1994, pp.218-231; Rawcliffe, 2018; Simonsson, 2006, pp.11-12).

Working with size categories like these, it is important to keep in mind that a certain type of dog can easily fall within two of the categories (see e.g. the Mastiff in the figure below). Also, one must remember that breeds and type-groups of dogs are likely to have changed standards throughout time (Duffy & Serpell, 2014, pp.31-34; Makowiecki, 2006, pp.63-65).

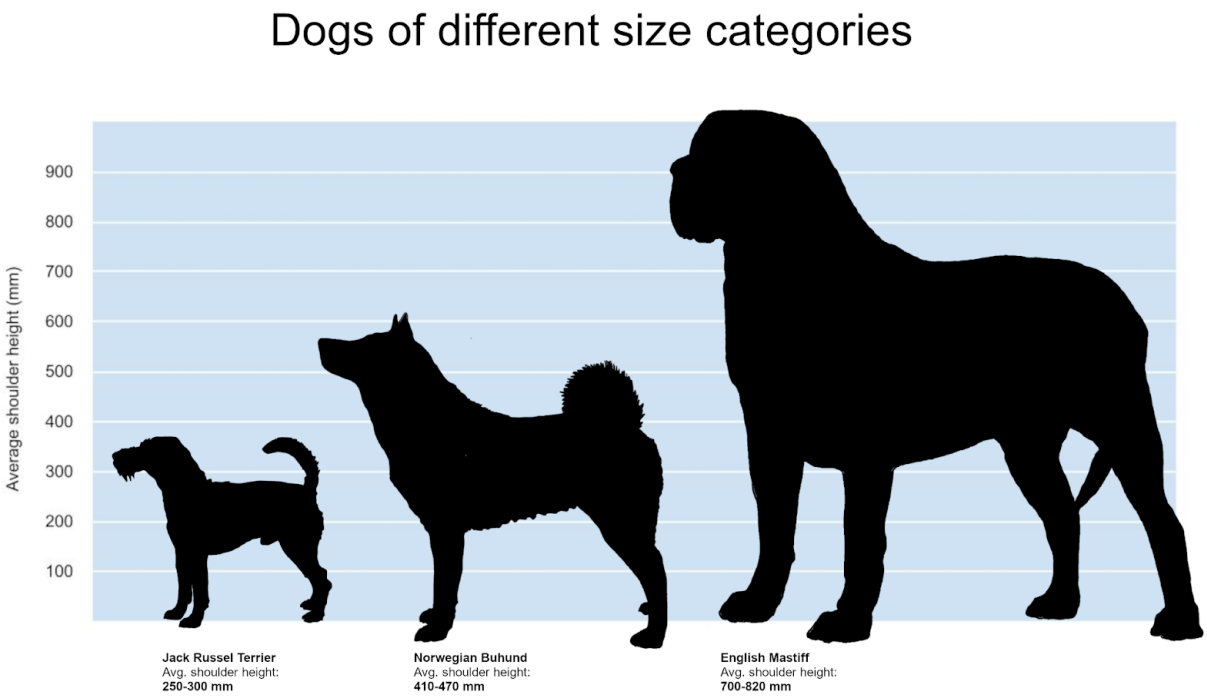


Figure 12: *Illustration showing average shoulder heights of examples of breeds that fall within the three different size categories described above. Small: Jack Russel Terrier, Medium: Norwegian Buhund, Large: English Mastiff.*

4.4 Morphology

The shape of a dog, as well as its size, can potentially tell us about what role it had during life. Through this study I have briefly touched upon analyses regarding morphology, by noting abnormalities visible to the eye. In skulls, I have looked for neoteny (*brachycephalic syndrome*; shortened snout and high forehead), e.g. seen in the Pekingese breed. And for the rest of the skeletal elements, I have looked for S-shaped long bones (*chondrodysplasia*), as seen in the likes of Dachshunds and Bassets (Huftahmmer shape group 2). A great addition to my study would be to look at morphology for example through GL vs. SD analysis, as well as a study of the skulls including morphometric data (Alonso et al, 2007, pp.66-69; Buzek et al., 2022, pp.1-18; Hufthammer, 1994, pp.223-231; Reitz & Wing, 2008, pp.287-315). For my discussion on morphology in the Norwegian material, especially Knoest's (2015) results will be a great addition to my own.

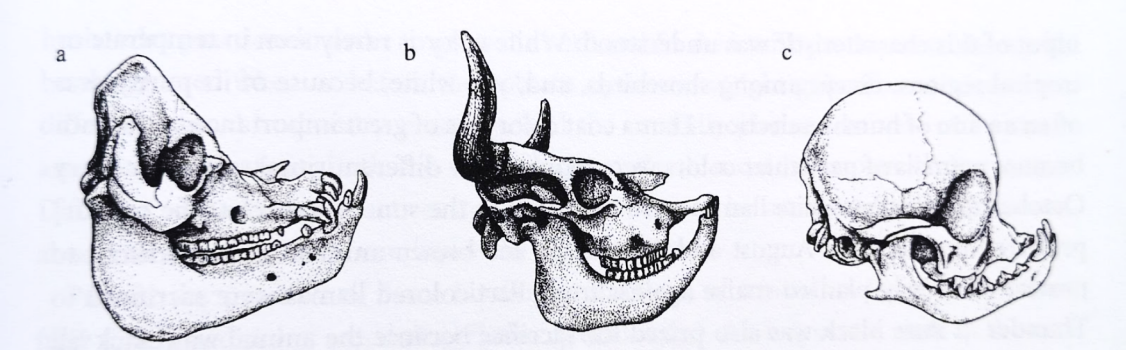


Figure 13: *Neoteny in skulls of a) pig, b) ox, and c) dog (Pekingese).*

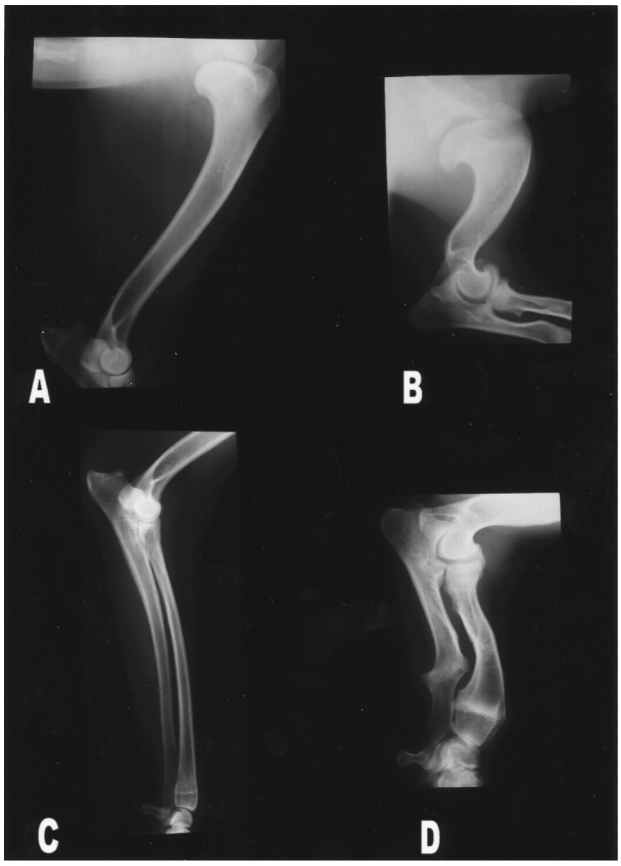


Figure 14: *Radiographs showing the humeri (A, B), and radii and ulnae (C, D), of a Doberman pinscher (left), as well as a Basset hound (right). The Basset hound has the dwarfism gene of chondrodysplasia, while the Doberman does not, and thus has regular long, relatively straight long bones.*

4.5 Age

The age at death of individuals can give us information on what the animals were kept for, as well as potential patterns in mortality rates, food preferences, trade, and other slaughter and animal-keeping actions and decisions. For my material, I have looked at age through epiphyseal fusion, as well as tooth eruption and tooth wear (Reitz & Wing, 2008, pp.192-199; Undheim, 1985, p.13).

4.5.1 Fusion stage

The fusion stage of the epiphyses (*ossification*) of the long bones can tell us the approximate age of an individual. The bones will go from having non-fused epiphyses, through fused epiphyses but with clear fuse lines, to finally a fully fused bone. These are the three different stages I have used to classify the fusion degree and thus the approximate age of the individuals. The downside of this method for age analysis is that different breeds, and dogs of different sizes will have their epiphyseal fusion happening at different ages (See **Appendix 10** for table of age determination based on bone fusion). The size of the dog has not been counted for in looking at the epiphyseal fusion in this study, and will thus not be as accurate as if it had been (Knoest, 2015, pp.88-89; Reitz & Wing, 2008, pp.193-199; Schmid, 1972, pp.74-75).

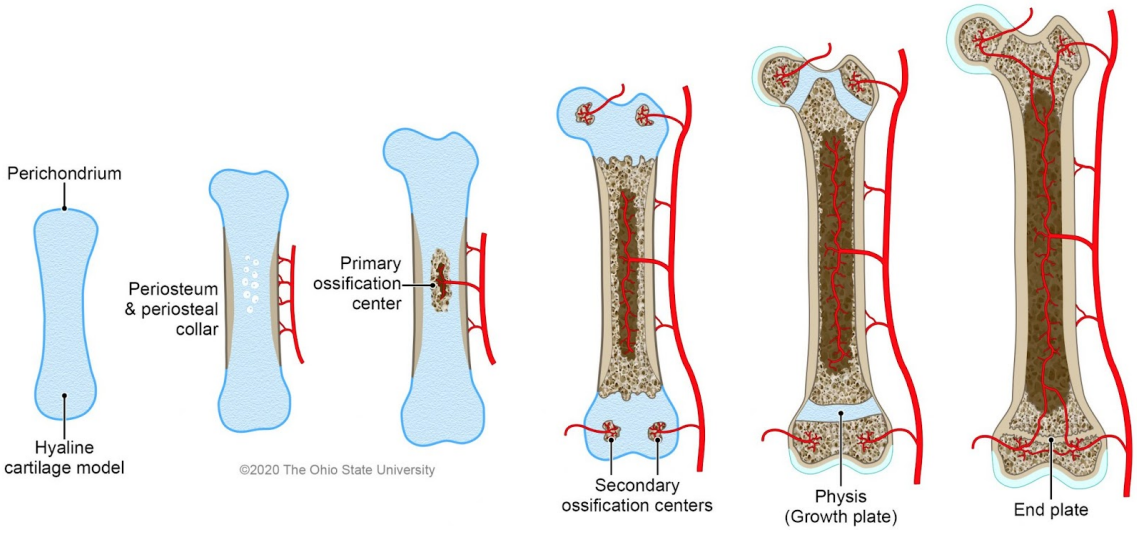


Figure 15: *The different ossification stages of long bones. Working with bones from archaeological contexts, the light blue parts (non-ossified) will in most cases be gone.*

4.5.2 Teeth

Teeth can tell us a whole lot about an individual. When looking at age at death, both tooth eruption, as well as tooth wear, can be informative. Heavy tooth wear will in most cases be reflecting an old(-er) dog, and teeth yet to erupt from the mandibula or skull will hint at a very young individual. I have looked at both of these variables in determining the approximate age for my material (O'Connor, 2000, pp.83-90; Reitz & Wing, 2008, pp.193-199; Schmid, 1972, pp.76-77).

Tooth eruption ages in dogs		
	Eruption of deciduous teeth (weeks of age)	Eruption of permanent teeth (months of age)
Incisors	3-4 w	3-5 m
Canines	3 w	4-6 m
Premolars	4-12 w	4-6 m
Molars	None	5-7 m

Table 11 : *Approximate tooth eruption ages of medium-sized dogs. Based on Kressin (2009). (Table recreated by author).*

4.6 Pathology

Pathology is the traces of illness and injury visible in the remains of an animal. The marks left on e.g. the skeleton by damage sustained in life. These sorts of traces can give us information about the health of the individual, as well as the potential cause of death. In regards to archaeology and domesticated animals, traces of human care towards animals, e.g. through a healed fracture, is of particular interest (O'Connor, 2000, pp.98-110; Reitz & Wing, 2008, pp.311-312).

For this study, I have looked for traces of pathology in all the material. Due to limitations, I have not looked too deeply into what caused found pathologies, but I have noted all visible pathologies recognized.

4.7 Cut and butchery marks

Different types of marks and where they are located on the bone can give us a variety of information. Depending on the marks, we can get information on who made them as well as what for. Type of marks as well as their location can reveal whether the animal was skinned, partitioned, etc., thus revealing the animal's role in the economy of the given society (O'Connor, 2000, pp.45-47; Reitz & Wing, 2008, pp. 122-134). In my analysis of the selected material, I've reported on all marks of this kind, visible to the eye. My main aim from looking at these marks is to see whether or not it seems like the dogs have been used for more than as a workforce; e.g. for their meat and/or pelt. Where cut and/or butchery marks are present, it will be assumed that the dogs have been used as material resources. This as it seems highly unlikely for people to spend time working the bodies for no/other reason(s). Animals worked with the aim of meat retrieval would usually be skinned regardless of whether or not the pelt would be kept or discarded of. It is thus hard to tell whether or not the pelts were part of the end goal of outcome for the dogs where both butcher and cut marks are found. As for partitioned dogs (individuals with butchery marks), the meat could have been used to feed the likes of birds of prey, other dogs, or people (Hufthammer, 1994, pp.234-237). When listing the number of markings found (in subchapter 5.2) I will list the number of elements with markings on them, NOT the number of markings (e.g.: 1 bone with two cut marks = listed as one account of markings found. I will go about listing the number of pathologies and gnaw marks found this same way).

4.8 Gnaw marks

Gnaw marks can provide information on aspects like the disposal of animals and animal remains, as well as on the presence of the animals who left the marks. Gnaw marks are

usually the result of an animal being disposed of in open air, in contrast to one being buried straight after death. The study of disposal method and location of an animal is usually linked to the owner's relationship to and perception of it (Gutierrez, 2017, pp.16-43; O'Connor, 2000, pp.47-51; pp.160-172; Reitz & Wing, 2008, pp.135-136). For this study, I have recorded all gnaw marks visible to the eye. Surface erosion has in part of the material made this challenging.

4.9 Site comparisons

The science of archaeology is greatly comparative in its methods, and has been since its early days. Comparative analysis thus has a long history within the field, and is to this day an important method in understanding archaeological material. The method of comparison can be utilised to study variation across time and space, and can reveal information on aspects like similarity or uniqueness (Peregrine & Smith, 2012, pp.4-16).

I will be comparing the tendencies of different locations, to potentially reveal similarities or differences between them; A so-called cross-cultural comparison. In conducting such comparisons I hope to achieve insight into how the locations compare to each other as a whole (Peregrine & Smith, 2012, pp.4-16).

To be able to make some of these comparisons I will have to convert and recalculate some of the data previously produced by others, so that we have comparable numbers to use. This will include the likes of calculating the percentage dogs represent out of the total bone collections, for the locations where this has not already been done, or e.g. identifying the number of dogs derived from MA periods where the total material of a site expands further.

Ideally I would be using comparative methods to look at the case of each location over time as well; a so-called diachronic comparison. This to create insight into the change in dogs and dog keeping over time at the chosen locations in the MA. But as I had to exclude the retracing of the dating of the contexts of each skeletal element, this type of comparisons will not be conducted for this study.

4.10 Categories and criteria

In my analysis, I've been working with the following categories:

- Tool marks: butchery -/partitioning -, chop -, and cut marks, as well as blows/punctures.
- Pathology: evidence of (pre-mortem) illness, visible in the osteological material.
- Gnaw marks: teeth marks, made by animals, post deposit.
- Ageing: tooth wear, tooth eruption, and epiphyseal growth/fusion.
- Size & height reconstructions: measurements taken of the bones, as well as height reconstructions made from a selection of them.

I used the following criteria for sorting the different types of marks in six different categories (bones with no apparent marks would only be counted in "Amount of fragments"):

Sorting criteria for markings found	
Category	Explanation
Amount of fragments	The total number of fragments analysed from the given location.
Tool marks	Number of fragments with clear / highly likely visible tool marks.
Potential tool marks	Number of elements with what appear to be tool marks, but which could need a closer look.
Pathology	Number of elements with clear / highly likely marks from illness or damage attained during life.
Potential pathology	Number of elements with marks that appear to be pathological, but could need a closer look.
Gnaw marks	Number of elements with clear / highly likely gnaw marks.
Potential gnaw marks	Number of elements with what appear to be gnaw marks, but which could need a closer look.
(not listed	The elements only listed in the first category represent bones either

further)	without any noticeable marks, or bones too heavily eroded to be able to tell erosion from potential other types of markings.

Table 12: *Criterias followed when placing the material in different categories regarding markings found. (Table by author).*

5. Data and Results

The first half of this chapter is dedicated to the presentation of data already collected and produced by those analysing the chosen material before me. As mentioned in **chapter 2**, this data stem from the likes of initial post-excavation zoo-osteology reports, as well as further studies done on Norwegian urban MA animals, foodways, and dog morphology.

In the second half of this chapter, I will introduce the data I have collected myself, looking at the material in question. The data was collected using the methods introduced and discussed in the foregoing chapter (**chapter 4**). Here, I will present overviews of the data collected, through the likes of figures and tables, as well as explanations of these. The full data sets of the collected data will be available in the appendix (**Appendix 11 - 14**).

In representing both existing data, as well as the new data collected for this study, I hope to get as great an insight as possible into the chosen material, given the existing limitations of time and space. Conducting further studies on archaeological collections is important in getting a more varied and wider understanding of the material.

5.1 Existing data

In this subchapter I will present data already collected and produced by others, on the chosen material and topic, conducted before I started my study. The amount of information being presented for the different locations will vary, as this depends on how much work has been previously carried out and the amount of data produced.

5.1.1 Bergen previous data

From Bergen, the data and results derived from previous studies conducted on the zooarchaeological material of Bryggen and Dreggen will be presented in the following subchapters. These studies were conducted by Hufthammer (1994), and Undheim (1985). In addition, Skaar (2014), as well as Knoest (2015), included dog material from Bryggen in their respective studies (see subchapter **5.1.3**).

5.1.1.1 Bryggen

The complete Bryggen zooarchaeological material collection has yet to be analysed in its entirety. Because of this, we do not currently have the TNF, nor NISP of the total material, nor such numbers regarding mammals or domesticates (Hufthammer, 1994; Hufthammer, communication per e-mail, 24.10.2022).

Osteological material of Bryggen	
Total ost. material (TNF)	200’000<
Mammals	(info not available)
Mamm. identified to species (Mammal NISP)	(info not available)
Domesticates	(info not available)
Canis familiaris	897

Table 13: *The osteological material retrieved from the Bryggen project has yet to be analysed in its entirety. Because of the collection's enormous size, only a small part of it has been analysed so far (Hufthammer, 1994; Hufthammer, communication per e-mail, 24.10.2022). (Table by author).*

In Hufthammer’s article (1994), she states how several hundred thousand bones were collected in total (and likely even more found, as not all bone material was collected in the early stages). 897 of these bones were whole or fragmentary bones (TNF) from dogs, of which 871 could be assigned to definite periods. The dogs were determined to stem from periods 3 through 7 (c. 1170-1476) (Hufthammer, 1994, pp.214-216).

Dogs of Bryggen excavations (1955-1972)						
	Period 3 1170 - 1198	**Period 4** 1198 - 1248	**Period 5** 1248 - 1332	**Period 6** 1332 - 1413	**Period 7** 1413 - 1476	SUM
TNF	67	712	47	43	2	871
With tool marks	10	308	23	17	0	358

Table 14: *Total number of dog bone fragments as represented by periods, and amount of which that has tool marks. (Based on Hufthammer, 1994, p.215, Table 1). (Table by author).*

Hufthammer's main aim for her study was to look at the changes in the Bryggen dogs over time. She looked at changes in the aspects of quantity, morphotypes, shoulder height, age, pathology, and more. Hufthammer ultimately found that there are big differences in the dog material of the different periods, in several different aspects. She states that there have been many dogs in Bergen in Period 4, and that we can not for certain say that it was not also the case for other of the periods (Hufthammer, 1994, p.213; p.217).

Size-wise, the biggest difference registered was between the dogs of periods 3 and 4. The dogs of period 3 seemed to be mostly of rather small or big size, while the dogs of periods 4 and 5 were generally of medium size. Based on the available information, the trend of keeping dogs that were distinctively small and big returned in Period 6. One can also see changes over time when it comes to the types of dogs present. Hufthammer divided the material into three categories: normal, dachshund-like, and dwarf pinscher-like dogs. She found that the dogs of the unusual limb formation types, the likes of dachshund and that of dwarf pinscher, increased in number over time. In Period 3 they only represented 3% of the dogs, in Period 4 13%, and in Period 6 they represented as much as 61% of the individuals. The dwarf pinscher type does not appear in the material until Period 4, but is dominating in the material by Period 6 (Hufthammer, 1994, pp.226-227; p.242-244).

When it comes to age and mortality, Period 3 gives the impression of a time with low mortality for young individuals. In Period 4, 50% of the bones with butchery marks were of young individuals, and a similar pattern is true for Period 5. In Period 3, only 12% of the bones show marks from partitioning. In Periods 4 and 5 the percentage is much higher, at 41% and 49% with such markings. The partitioning rate is high also in Period 6, at 42% (Hufthammer, 1994, pp.242-244).

Hufthammer expresses how it seems the dogs of Bryggen were given more value in the time before c.1200, based on aspects like butchery marks, mortality rates, and pathology. She connects the high amount of partitioned dogs in periods 4 and 5 to dog meat production/consumption. Hufthammer relates it to an act of necessity, as contemporary

literary sources judge the consumption of dogs as taboo. In addition to being a source of food, she notes that the dogs were likely kept as pets, for hunting, and as guard dogs as well (Hufthammer, 1994, pp.242-244).

5.1.1.2 Dreggen

The osteological material of Dreggen consists of 21’346 pieces, of which 9’102 (42,6%) were identified to taxa. Of the mammal material, 42,2% could be identified to species. Undheim identified 25 of the mammal bones to be of *Canis familiaris* (for the bone elements representing dogs see **Table 16**, and for dog material presented by epochs of origins see **Table 17** below). In Undheim’s Table 7 (1985, p.23), he marks the mammal species which he believes were consumed by humans. Dogs are not marked as such (Undheim, 1985, pp.19-23; p.27).

Osteological material of Dreggen	
Total ost. material (TNF)	21’346
Identified to taxa (NISP)	9’102
Mammals	20’404
Mamm. identified to species (Mammal NISP)	8’609
Domesticates	8’532
Canis familiaris	25

Table 15: *The osteological material of Dreggen, identified to different levels and groups (Based on Undheim, 1985). (Table by author).*

Bone elements at Dreggen	
Canis familiaris	**Amount**
Cranium	3
Mandibula	6

Scapula	2
Humerus	4
Radius	2
Ulna	3
Femur	3
Tibia	2
SUM	**25**

Table 16: *The number of the different elements of dog bones found at Dreggen (Based on Undheim, 1985, p.20). (Table by author).*

Undheim links most of the bone material of Dreggen to kitchen middens (waste disposal). For analyses, he focused on age-at-death determination, and height reconstruction of the dogs (Undheim, 1985, pp.11-12; pp.16-18). When it comes to dogs, they only represent 0,3% of the domesticate material (also counting the four Canidae elements). The amount of dogs decreases significantly over time (see **Table 17** below). Most dogs seem to have been adults, and most of the recalculated shoulder heights ranged from 35cm to 39cm. Three individuals differed from this, at 32cm, 41cm, and 46cm. Undheim finds the dogs of Dreggen to have been approximately the size of the Norwegian Buhund (see my **Figure 12**, subchapter **4.3.2** for size chart), and believes that the dogs roamed freely, and therefore would not be of any specific breed. He also mentions the use of dogs in regard to fox hunting and fox pelt trade (Undheim, 1985, p.23; p.27; pp.48-49; pp.72-73).

Dog material of Dreggen as by epoch	
Epoch	**Canis fam.**
1 (1170 - c. 1300)	18
2 (c. 1300 - 1332)	4
3 (1332 - 1527)	3

Table 17: *Dreggen bone elements of* Canis familiaris*, presented by epochs of origin (Based on Undheim, 1985, p.23). (Table by author).*

5.1.2 Trondheim previous data

From Trondheim, the data and results derived from previous studies conducted on the zooarchaeological material of Folkebibliotekstomten, Televerkstomten, and Erkebispegården will be presented in the following subchapters. These studies were conducted by Lie (1989), Marthinussen (1992), and Hufthammer (1999). In addition, Bergland (2014) included zooarchaeological material from Folkebibliotekstomten and Televerkstomten in her study (see subchapter **5.1.2.3**), and Skaar (2014) and Knoest (2015) both included material from all three of the Trondheim locations in their respective studies (see subchapter **5.1.3**).

5.1.2.1 Folkebibliotekstomten

The initial analysis of the zoo-osteological material from Folkebibliotekstomten was carried out by Lie (1989). The analysed bones were gathered from an area only representing c. 22% of the total FBT site. Included in Lie's study were bone material from phases 1-3 and 8-10, out of which there were only registered bones of *Canis Familiaris* from phases 1, 3, and 10 (see the complete list of numbers on the osteological material of Dreggen in **Table 18** below)(Lie, 1989, pp.4-8).

Osteological material of FBT	
Total ost. material (TNF)	26'301
Mammals	24'178
Mamm. identified to species (Mammal NISP)	17'268
Domesticates	16'604
Canis familiaris	10

Table 18: *Numbers representing the osteological material from phases 1-3, 6, and 8-10 (Based on Lie, 1989, pp.30-32). (Table by author).*

Canis familiaris	**Phase 1** (c. 900-1020)	**Phase 3** (c. 1025-1050)	**Phase 10** (c. 1325-1523)
Cranium		1	
Humerus	1		
Radius		1	
Ulna	1		
Femur			1
Tibia	2		3
Total	4	2	4

Table 19: *All ten dog bones registered from Folkebibliotekstomten (Based on Lie, 1989, pp.29-61). (Table by author).*

Lie found that, out of the mammal material representing domesticates, there were very few cats and dogs. Regarding the dog bones, Lie mentions how they are not equally represented throughout time. We can see from the table above (**Table 19**), how six of the dog bones represent phases 1-3 and only four dog bones phases 8-10. Assuming this is what he was referring to, the material might give us an image of the number of dogs at FBT decreasing over time. However, Lie expresses that it shouldn't be given too much focus, probably because it is a very sparse material from a very selective collection. Lie briefly mentions the dogs' size (without letting us know which methods were involved), where he claims the dogs were of medium size, approximately the size of a modern Norwegian Buhund (Lie, 1989, pp.4-14; pp.23-24).

5.1.2.2 Televerkstomten

Marthinussen (1992) conducted the initial analyses of the TVT zoo-osteological material, as the project for her major in zoology. The complete zooarchaeological material from the TVT site consists of 28'094 elements. Timewise, Marthinussen looked mainly at the material from epochs 1 through 3; the Medieval material (revisit phasing under subchapter **2.3.3**

Televerkstomten). This selection, as well as some other exclusions, left her with 18’883 elements, of which 10’288 could be decided to taxa (Marthinussen, 1992, pp.6-11; pp.25-26).

Osteological material of TVT	
Total ost. material (TNF)	28’094
Marthinussen’s selections - round 1	
Selection - round 1 (TNF)	27’766
Identified to taxa (NISP)	15’403
Marthinussen’s selections - round 2	
Selection - round 2 (TNF)	22’005
Identified to taxa (NISP)	12’001
Mammals	19’686
Mamm. identified to species (Mammal NISP)	10’009
Domesticates (“husdyr”)	9’765
Canis familiaris	31
Marthinussen’s selections - round 3	
MA material - epochs 1-3 (TNF)	18’883
Identified to taxa (NISP)	10’288
Mammals	16’774
Mamm. identified to species (Mammal NISP)	8’448
Domesticates (“husdyr”)	8’324
Canis familiaris	23

Table 20: *Table showing the numbers of the osteological material of Televerkstomten. Marthinussen, who analysed the material, made several rounds of selections: Round 1: all material minus material from unstratified layers and minus all Mollusca and Decapoda. Round 2: round 1 selected material minus all material of mixed and uncertain phasing.*

Round 3: round 2 selected material minus the material of epoch 4 (Marthinussen, 1992, p.6). (Table by author).

In Marthinussen's tables *6a* and *6b* (1992, p.18) she lists which mammals are represented in the material of which periods, as well as by number of elements. In addition, she marks the ones she believes were used for consumption. The dog material is not marked thereafter. Marthinussen has made separate tables (tables *9a, 9b,* and *9c*) to account for which skeletal elements of the animals that are present. For her numbers on dogs see **Table 21** and **Table 22** below (Marthinussen, 1992, pp.17-25).

Dog bones of TVT			
Marthinussen Table *6a*		Marthinussen Table *6b*	
Phase	Fragments	Phase	Fragments
1		**3 *or* 4b**	
2a		**2b, 3 and 4b**	11
2b		**4b and 5**	1
3	9	**5 and 6**	
4a	10	**5 *or* 6**	
4b	4	**6 *or* 5**	
5		**6 *or* 7c**	
6		**8b *or* 8a**	
7a		**8c *or* 8b**	
7b			
7c			
8a	8		
8b			
8c			
9			

SUM	31	SUM	12
TOTAL		43	

Table 21: *Number of dog fragments from the TVT site. 6a presents the material of distinct phases, while 6b presents the material of indeterminable and mixed phases (Based on Marthinussen, 1992, p.18). (Table by author).*

Dog bones of TVT - elements			
	Marthinussen Table *9a* *Mixed/indecisive phases*	Marthinussen Table *9b* *Phases 1-9*	Marthinussen Table *9c* *Phases 1-7*
Element	Number	Number	Number
Cranium	1		
Atlas		3	3
Vertebrae, div.	3	8	1
Scapula	1	1	1
Humerus		3	3
Radius		3	3
Ulna	1	4	4
Os sacrum		1	
Femur	2	3	3
Tibia	4	3	3
Fibula		1	1
Phalanx I		1	1
Total	12	31	23

Table 22: *Number of dog remains as listed by skeletal element (Based on Marthinussen, 1992, pp.21-23). (Table by author).*

Of the domesticates of the total identified material, only 1,1% stems from the likes of *Equus*, *Felis catus*, and *Canis familiaris*. Meaning, there are very few individuals of horses, cats, and dogs in the TVT material. In the total material, dogs (*Canis familiaris*) only represent 0,36%, in phases 1-9: 0,31%, and in phases 1-7: 0,27%.

When looking at the number of fragments per phase, it shows that the appearance of dogs throughout time at TVT fluctuates (See **Table 23** below). Dogs do not appear in the material until towards the end of the Early MA and are then present towards the middle of the High MA. After this, dog material does not reappear again until the beginning of the 1600s (Marthinussen, 1992, pp.30-31).

% of the total TVT zoo-osteological material being dogs							
Phase	1 - 2b	3	4a	4b	5 - 7c	8a	8b - 9
%	0	0,66	1,48	0,26	0	2,93	0

Table 23: *Percentage of the total zoo-osteological material representing dogs, as by phase (Based on Marthinussen, 1992, pp.30-31). (Table by author).*

Marthinussen compares the amount of dog material at TVT to other mediaeval sites in Norway. The results show that TVT contains relatively more dog material than FBT, while Dreggen in Bergen contains approximately the same amount as TVT (Marthinussen, 1992, p.61).

When it comes to the age of the *Canis familiaris* individuals of TVT, Marthinussen used epiphyseal age calculations. In the TVT material, there were three dog bones missing their epiphyses, which would put these individuals somewhere between the age of 0 and up towards 1½ years old (making them non-adults). The three young dogs of TVT stem from phases 3 and 4a (Marthinussen, 1992, pp.61-62).

In her conclusions, Marthinussen notes that the dogs of TVT seem to have lived normal lives in regards to lifespan, as only a few of the bones were of young individuals. When it comes to the type of dogs, she writes that one can not make any conclusions, as none of the bones were applicable to measurements. She ends on the dogs by stating that there is no significant

difference in the young-to-adult ratio between epoch 1 and epoch 2. Marthinussen also mentions how the material of TVT is likely to be made up of household waste, deposited throughout time (Marthinussen, 1992, p.86; pp.92-93).

5.1.2.3 Bergland, 2014

As mentioned in the Research History chapter (ch. **2**), Bergland's aim in including cats, dogs, and horses in her study was to see how these animals, that we today consider as "pets", compare (see **Figure 16** below) (Bergland, 2014, p.vii; pp.65-66).

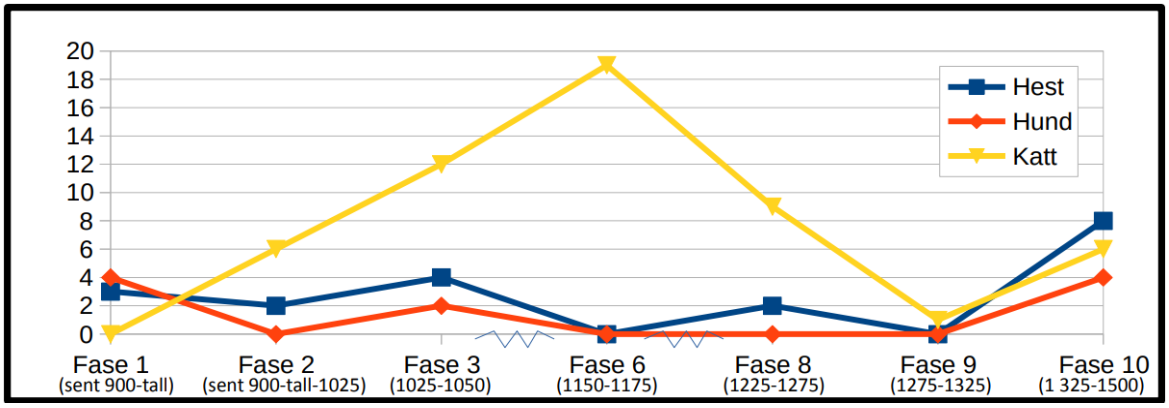


Figure 16: *The number of fragments from horses (blue), dogs (red), and cats (yellow), throughout the phases of FBT.*

As for her table on "pets" from FBT (above), Bergland mentions how there's a relatively low number present from all three animal groups, and that the low number of dogs are seen in connection to burial practices (mentioned below). As for the dog material, she mentions that the ten dog bones of FBT probably represent nine individuals (Bergland, 2014, p.65-73).

Bergland puts forth the theory that the lack of a bigger dog material is a sign that the dogs were not eaten by the people of Trondheim, and thus were disposed of elsewhere than the food and production scraps/animals. She notes that perhaps most dogs of Trondheim would be buried somewhere outside of the city, and that the dogs found at FBT and TVT might in fact be the remains of strays, victims of dog fights, or individuals that had been skinned/used for production (Bergland, 2014, p.72).

The following quote is from Bergland's thesis: *"...his skin is not taken off, nor his flesh is not eaten or buried, but left finally to flies, and to other divers worms"* (*Mediaeval Lore from Bartholomew Anglicus*, 13th century). Bergland sees this as a hint of dogs not being used as a material resource to the extent that horses and cats were. Due to the lack of in-detail analysis of the bone material, Bergland could not make any conclusions on whether or not the FBT and TVT dogs were used for such (Bergland, 2014, pp.72).

Bergland compares the given dog material to that of finds of Bergen and Oslo, concludes that the dogs of these three mediaeval towns look to have been roughly of the same medium size: circa that of a modern Norwegian Buhund. She goes on to discuss how far this type of animal, which we today categorise as a "pet", could also be categorised as such for the MA, finding it seemingly not to be the case. When it comes to the role of the dogs, she instead discuss the possibility of them belonging in roles as hunting dogs, and guard dogs. In looking at the dog remains in the light of the remains of wild animals found at the sites, Bergland concludes that the material gives but a weak indicator of the fact that the dogs of FBT and TVT *might* have been used for hunting (Bergland, 2014, pp.65-66; p.71; pp.73-77).

As for FBT, she also for TVT presents the number of dog bones through time, alongside those of horses and cats (see **Figure 17** below)(Bergland, 2014, pp.65-66).

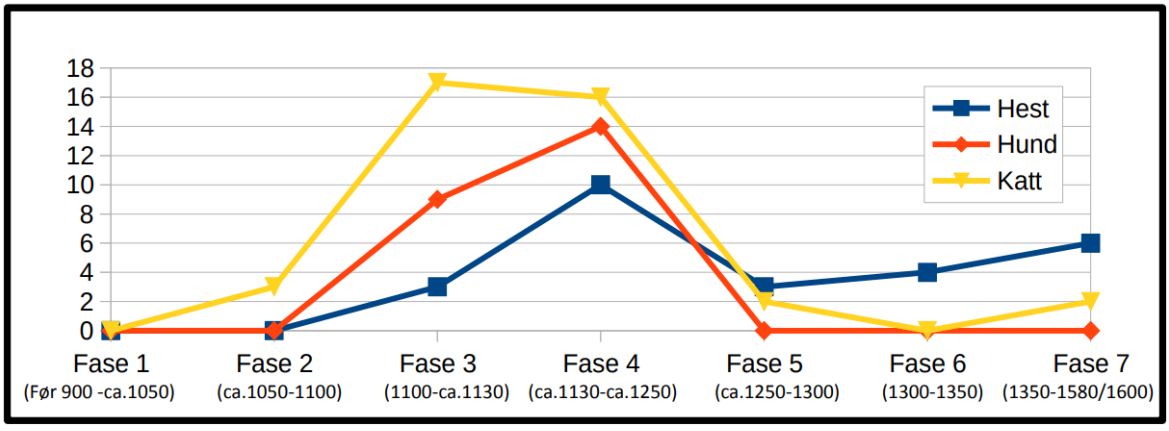


Figure 17: *The number of fragments from horses (blue), dogs (red), and cats (yellow), throughout the phases of TVT. Figure by Bergland (2014, p.66).*

For neither of her TVT table on "pets" (**Figures 16** and **17** above), she says much about it in regards to dogs *. Bergland notes that the consumption of animals which the church had

deemed illegal/unholy to eat, could have happened in Trondheim. This despite it having been risky, dwelling in the vicinity of the Erkebispegård (Archbishop's palace)(Bergland, 2014, pp.65-73; p.68).

* Note by author:

However, one can see a clear increase in all three animal groups in phases 3 and 4. If the animal remains found in the city are indeed mostly food and production scraps, this could be the result of a famine or other need for extra food sources; a situation where one would need to utilise sources not regularly seen as food.

5.1.2.4 Erkebispegården

The initial report on the osteological material of EBG was published by Hufthammer (1999). In total 35’303 bones were analysed, of which 31’197 (88,4%) were from mammals. The mammal material stems from 22 different species, one of which represents dogs. The osteological material’s origins span from c. 1250-1983, but the majority stems from c. 1500-1800 (Hufthammer, 1999, p.4).

Osteological material of EBG		
	Area A	**Area B**
Total ost. material	17’957	17’346
Mammals	15’433	15’764
Mamm. identified to species	8’423	(info not available)
Domesticates	7’791	(info not available)
Canis familiaris	32	29

Table 24: *Osteological material from areas A and B of EBG (Based on Hufthammer, 1999). (Table by author).*

Dogs of Erkebispegården									
Period	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Area A	1		16	11		2		2	
Area B			7		5	11	2	4	

Table 25: *Number of dog elements from areas A and B of EBG, according to period (Based on Hufthammer, 1999). (Table by author).*

In total, 61 bones of *Canis familiaris* were found at EBG areas A and B (see **Table 25**, above, for dispersion throughout the different periods and the two areas). Hufthammer points out how overall there are quite few dogs in the material, and that there seem to be more dogs from the older periods (6-9), than the younger ones (10-11). Out of the 61 dog bones, Hufthammer reports that only two of them were applicable to measurements for size reconstruction (see **Table 26**, below)(Hufthammer, 1999, p.9; p.36).

Reconstructed shoulder heights of Erkebispegården dogs				
Species	**Period**	**Skeletal element (bone)**	**Greatest length (GL) of bone**	**Reconstructed shoulder height**
Canis familiaris	6	femora	130,4 mm	32 cm
Canis familiaris	8	ulna	189,0 mm	53 cm

Table 26: *Dog bones from area A and B of the 1991-1992 excavations of EGB (Based on Hufthammer 1999, p.36). (Table by author).*

By visually judging the rest of the dog bones, Hufthammer determines most of the dogs to have been of small to medium sizes (c. 32-53 cm), and of normal build. A few of the bones stray from this pattern, and are different in one way or another. Among these, there is a massive jaw bone from period 6, bigger than those of comparative modern wolves. Hufthammer estimates this individual to have been over 80cm tall. Another bone, a humerus

from period 10, is distinctively curved; she estimates it to have belonged to a Dachshund-like dog, at under 32 cm in height (Hufthammer, 1999, p.36).

Over half of the dog bones found in areas A and B of EBG have cut and/or butchery marks. Hufthammer reports of both cut and butchery marks on several long bones. These long bones belonged to small individuals, from periods 9 and 10, and among them the Dachshund-like individual. Hufthammer notes that if the dogs were skinned, there would be marks left on their skulls, the likes of cut marks at the snout and above the eye. But as there were no skulls present in this selection, one can not say for certain which activities the cut marks present represent (Hufthammer, 1999, p.36).

5.1.3 Norway overall previous data

Below I will present the results of the two studies included on the situation of MA urban sites across Norway; Skaar (2014), and Knoest (2015).

5.1.3.1 Skaar, 2014

Skaar studied the foodways of MA Norway. She mentions how the food culture of Norway changed entering the MA, going from Norse to Christian rules and rituals. The rules can be found as laws in the likes of the Norwegian legislations of "Gulatingsloven" and "Frostatingsloven". The Christian part of the laws were the ones to mention which food not to eat, as religion and food seem to have been tightly knit. In Iceland, there are similar examples, e.g. in Bishop Arne's Christian legislations. There it says to not eat cats, dogs, or foxes, as well as any other animal or bird with claws. Skaar mentions, however, that both dogs and cats have been partitioned and skinned in Medieval Norway, and one might imagine the meat to have been consumed as well, in times of need. "Gulatingloven" seems to back this theory, by saying "*rather shall he eat dog, than dog shall eat him*" (in: Skaar, 2014, p.65).

Skaar expresses how cultures categorise foods into two groups; pure versus impure. The foods regarded as impure are connected to danger and disorder, something one can find

examples of in e.g. the Old Testament of the Bible. Breaking the laws in the MA, for example by eating forbidden animals/foods, could have serious consequences. Consequences like losing your property, losing your social/legal security, and getting exiled. Skaar (2014, p.69) cites Mary Douglas: "*By rules of avoidance holiness was given a physical expression in every encounter with the animal kingdom, and at every meal*" (Skaar, 2014, p.69).

Skaar concludes with results of being able to see regional differences in food preferences and food-related rules throughout MA Norway. Overall, the food norms and rules seem to have changed quite a bit with the transition to Christianity. For instance, meat went from being a food of high status to becoming a food category connected to sin (Skaar, 2014, pp.71-74).

5.1.3.2 Knoest, 2015

Knoest's aim was to create insight into what the dogs of MA Norway looked like. Through his study, he found that there were several types of dogs present in Norway in the MA. The skull types found in Trondheim are also found in Bergen. He expresses that the dogs of the MA look to be equally morphologically different from wolves as present dogs are. Knoest finds toy-sized dogs in the material, as well as dogs that have the traits of mongrels. As for the size of the dogs, he notes that the MA material shows great variation, having up to as big a range in dog sizes as we have today (Knoest, 2015, pp.85-88).

When it comes to the height of the dogs, Knoest finds that the MA dogs were comparable to the heights seen in modern dogs. He notes that most of the MA dogs go within the average shoulder height range of 35-55 cm, but that more are placed towards the shorter end of the scale. All in all, Knoest finds the MA dogs of Norway to be slimmer and with fewer extreme features than the modern dogs we see today. As to the value of the MA dogs, he notes that the lack of more big specimens might be due to the fact that they would be more "expensive" to keep (more resource-demanding) than the smaller types. And for what he calls "trophy dogs", Knoest mentions how they could have been given a different treatment, and thus also a different way of disposal at death, and might therefore not be present in the (midden) material of the MA towns (Knoest, 2015, pp.88-91).

5.1.4 Iceland previous data

5.1.4.1 Gásir

The most recent Gásir project was carried out with the intention to retrieve as much information as possible about the post-1300 CE period of the site. As the site activity ended around 1400 CE, the time span dealt with is relatively short. Because of this, there have not been made period or phase distinctions for the Gásir material, as we see for most of the other locations dealt with here. For the sake of this thesis, and based on the overall dating of Gásir activity, the dogs found at Gásir likely all stem from roughly the 14th century (Harrison et. al, 2008, p.100).

Osteological material of Gásir	
Total ost. material (TNF)	25’754
Tot. identified to species (NISP)	15’735
Mammals	2’477
Domestic mammals	2’381
Canis familiaris	15

Table 27: *Gásir area A zoo-osteological material (Based on Harrison, 2009). (Table by author).*

With a NISP of 15, dogs make up 0,63% of the total domesticates found. The overall composition of types and amounts of animals present at the site is deemed similar to those of higher-status sites (like Bessastaðir and Viðey, close to Reykjavík), sites that were in the area of important religious and political seats (Harrison, 2009, pp.12-13).

The estimated number of individuals (MNI) for Gásir dogs are 11, and five of them are deemed to be of the small, lap-size dog type. Harrison managed to do height reconstructions for three of the individuals: 27,2cm [1551], 31cm [2812], and 31,2cm [2851]. They would be slightly larger than a modern Pomeranian. One of the small dogs was found in a midden

deposit, a “dump area”. Harrison questions why a high-status lap dog was disposed of in such a way. For one of the normal-sized dogs [2452], the bone element was found to be burnt. This individual is thought to maybe have been carrying disease, and thus burnt at death to prevent spreading (Harrison, 2009, pp.19-20).

Harrison highlights an individual from context [2812]. This specimen is represented by much of its skull, as well as its upper forelimbs. The dog was compared to both an arctic fox as well as small modern dog breeds. The result was that the individual was of *Canis familiaris* species, but did not match any of the modern breeds. Harrison sees these small, lap-dog-sized dogs in relation to having been status symbols, as well as the potential of their use as parasite relief for their owners. Further, the report concludes with no signs of dogs being kept as a food source at Gásir. The presence of dogs at the site is strengthened by the finds of dog gnaw marks on the bone material. These marks are also noted to coincide with the dogs found (Harrison, 2009, p.4; p.7).

5.1.4.2 Oddstaðir

Osteological material of Oddstaðir	
Total ost. material (TNF)	9’055
Total fragments identified to species (NISP)	2’300
Mammals	1’326
Domestic mammals	1’315
Canis familiaris	1

Table 28: *Oddstaðir zoo-osteological material (Based on Harrison, 2012). (Table by author).*

Osteological material of Oddstaðir as by phases			
Phase	**Tot. NISP**	**Domesticates**	***Canis fam.***

2	836	447	
3	650	268	
4	356	250	
5	458	350	1
SUM	2’300	1’315	1

Table 29: *NISP of the osteological material of Oddstaðir, as by phases of origin (Based on Harrison 2012, pp.20-22). (Table by author).*

In regards to dogs, Harrison reports on one fragment, from phase 5 (late 13th - late 14th c.), making up for 0,29% of the domestic mammals of that phase. She goes on to mention how horses and dogs must have been of little importance as food resources for the people at Oddstaðir, as there were very few bone fragments of these two species present in the midden material (Harrison, 2012, pp.26-30).

In the section specifically regarding dogs, Harrison notes that the dog element present does in fact consist of two separate parts/fragments; one left and one right premaxillary fragment. These two parts make up a (partial) skull of a single individual. The skull is compared to a polar fox skull found at an Icelandic location called Hrísheimar, which it closely resembles in size. Harrison goes on to mention several more dog fragments: fragmentary maxilla, fragmentary occipital bone, fragmentary innominate bone, and one lumbar vertebra element. No more information is given on these fragments, but it might seem like they are all thought to belong to the same individual, of a context [108] (Harrison, 2012, pp.44-46).

The Oddstaðir dog is reported to be small, and thus comparable to the individual from Gásir context [2812]. These small dogs are referred to as likely being lap dogs, kept for companionship rather than as workforce. Harrison puts forth how visiting traders, and in some instances Icelandic aristocrats, would keep these small dogs as a fashion statement. She continues by noting that it was common for the MA aristocracy to keep small dogs as pets. Nevertheless, in Iceland, they seem to never have replaced their medium-sized sheep herding dogs (Harrison, 2012, pp.44-46).

Harrison also looked at gnaw marks from dogs on the Oddstaðir bone material. In total she finds 7 certain, plus 8 potential, bones with such marks. Most of them belong to phase 4. She looks at the varying amount of gnaw marks as an indicator of how easily the dogs of the farm could access the bones (at the midden/food disposal area) (Harrison, 2012, pp.44-46).

5.2 My data

Here I will present the data I collected myself for this study. Most of the data collected by me had already been collected by others before me (as presented in the first half of this chapter). There are several reasons why I decided to redo most of the measurements and analysis. The most important reason is the assurance that all data collection was done as consistently as possible, to reveal possible patterns. It is, though, important to notice that for some of the locations I will not have analysed the complete collection of *Canis familiaris* material in existence. This is as some of the material was unavailable during my period in the bone lab (e.g. lent to museums).

5.2.1 Norway

5.2.1.1 Bergen

Below I will present the data that, through this study, has been collected on the chosen material of Bergen.

5.2.1.1.1 Bryggen

This study resulted in 46 fragments (NISP), with an approximate MNI of 24, from the four selected Bryggen excavations (JS.387, JS.406, JS.492, and JS.529). In comparison to Hufthammer's analyses (1994) of the complete Bryggen material, with a NISP of 871, I only looked at 5,3% of the material. This means the data collected for Bryggen through this study only will give us a glimpse of what was once present in the given time and space. For this

reason, Hufthammer's findings have also been included (in the foregoing subchapter of 5.1.1.1), and will be discussed alongside the new data represented below.

Bryggen material			
Location name	**Museum no.**	**Fragments analysed**	**% of total**
Bryggen 1958	JS.387	1	2,2%
Bryggen 1960-2	JS.406	6	13,0%
Bryggen 1967	JS.492	26	56,5%
Bryggen 1970	JS.529	13	28,3%
SUM		46	100%

Table 30: *The different Bryggen excavations from which bones have been analysed, as well as the number of fragments analysed. (Table by author).*

Above you can see which excavation seasons (as by Location name) the selected material from Bryggen derives from. The majority of the material, representing 26 of the total 46 elements, stems from the Bryggen 1967 excavation project. Below are listed which skeletal elements these 46 fragments represent, as well as on what type of elements there have been found markings (tool-, pathology-, or gnaw marks).

Bryggen dogs (NISP)							
Element	Amount of frags.	Tool marks	Potential tool marks	Path-ology	Potential pathology	Gnaw marks	Potential gnaw marks
SKL	13	2	4		2		
MAN	8	3	2				2
TTH	8						
VER	2						
RIB	2						

INN	2	1					1
HUM	2		1				1
ULN	1						
RAD	4		2				1
FEM	2	1					
TIB	2	1					
SUM	46	8	12	0	2	0	5
%	*100*	*17,4*	*26,1*	*0*	*4,4*	*0*	*10,9*

Table 31: *Bryggen material analysed by author, listed by skeletal element. The number of the different elements present, as well as how many of them there have been found markings. (Table by author).*

In the Bryggen material, I registered eight accounts of clear tool marks, as well as an additional nine potential ones. As for pathology, I only registered two potential accounts. And for gnaw marks, I registered five potential accounts. The relatively high number of skulls represented can be explained by early collection strategies (as explained by Hufthammer, 1994, p.213).

Bryggen individuals with (potential) markings								
Museum (JS) no.	Fragment ID	Skeletal element	Tool marks	Potential tool marks	Pathology	Potential pathology	Gnaw marks	Potential gnaw marks
387	14999	SKL		x				
406	20433	SKL	x	x				
406	21644	SKL		x				
406	19325	SKL	x	x				
406	21350	SKL		x		x		
406	19325	MAN	x					
406	19325	MAN	x					

492	69564	SKL				x		
492	69564	SKL		x				
492	69564	MAN		x				x
492	69564	MAN		x				x
529	72388	INN	x	x				
529	72388	RAD		x				
529	71922	HUM		x				x
529	71922	RAD		x				x
529	71917	INN						x
529	72382	TIB	x					
529	72382	MAN	x					
529	72392	FEM	x					

Table 32: *Markings found in the dog derived skeletal elements of the different chosen Bryggen excavations. The elements containing the markings and potential markings are listed by registration number. (Table by author).*

Figure 18 (left): Skull [20433] JS.406, with a puncture to the maxilla. **Figure 19 (right):** Mandible [72382] JS.529, with two clear cut marks to the condylar process.

Figure 20 (left): Tibia [72382] JS.529, with a cut mark atop the medial malleolus. **Figure 21 (right):** Skull [69564] JS.492, with potential pathology around tooth rows, and a skeletal abnormality to the left temporal process.

In the figures above are shown some examples of the markings found in the selected Bryggen material. Figure 18 (top left) shows a partially crushed (left parietal) skull [20433] with a puncture to the left maxilla. Presumably, the crushing of the skull is post-mortem damage, but the piercing of the maxilla could be a potentially lethal blow. Figure 19 (upper right) shows a right mandible [72382] with clear cut marks. Two horizontal cut marks can be seen at the condylar process. The same mandible also has a chop mark at the bottom of the centre of the mandibular body (not included in the picture). These marks could stem from skinning (the cuts) and partitioning (the chops). Figure 20 (bottom left) shows a right tibia [72382], with a horizontal (laid vertical in the picture) cut mark above the medial malleolus. This can potentially stem from skinning. Figure 21 (bottom right) shows the left side of a partial skull [69564]. Presumably, there is some pathology present, related to oral health. This as holes have formed where there should have been skeletal matter of the skull covering the roots of the teeth underneath. The same skull also has two teeth where only the roots are left. This could also be a potential sign of oral health issues if the damage was contracted during life. A third area of potential pathology to this skull is its left zygomatic bone, where the back end of the temporal process does not end in the typical elongated point. The reason for such an abnormality or pathology to the zygomatic I do not know.

In the illustration below (**Figure 22**) the elements present in the selected Bryggen material by at least one fragment are coloured grey (except for the ribs and vertebral elements, as I could not identify exactly which ones they represent). In addition, all obvious chop/cut/butcher/piercing markings found have been drawn in. The cross at the left maxilla indicates the piercing blow discussed above. The line going all the way through the right radius represents a distal radius possibly chopped off from the rest of the bone. The other lines represent separate cuts found. All in all, this gives us a picture of the Bryggen dogs likely being killed, partitioned, and skinned there. In addition, we can say that at least some of the dogs must have suffered from oral health issues, potentially related to tooth rot. The collection is too small to say much about norms and trends, but these examples can give us a glimpse into what may have occurred based on these few instances.

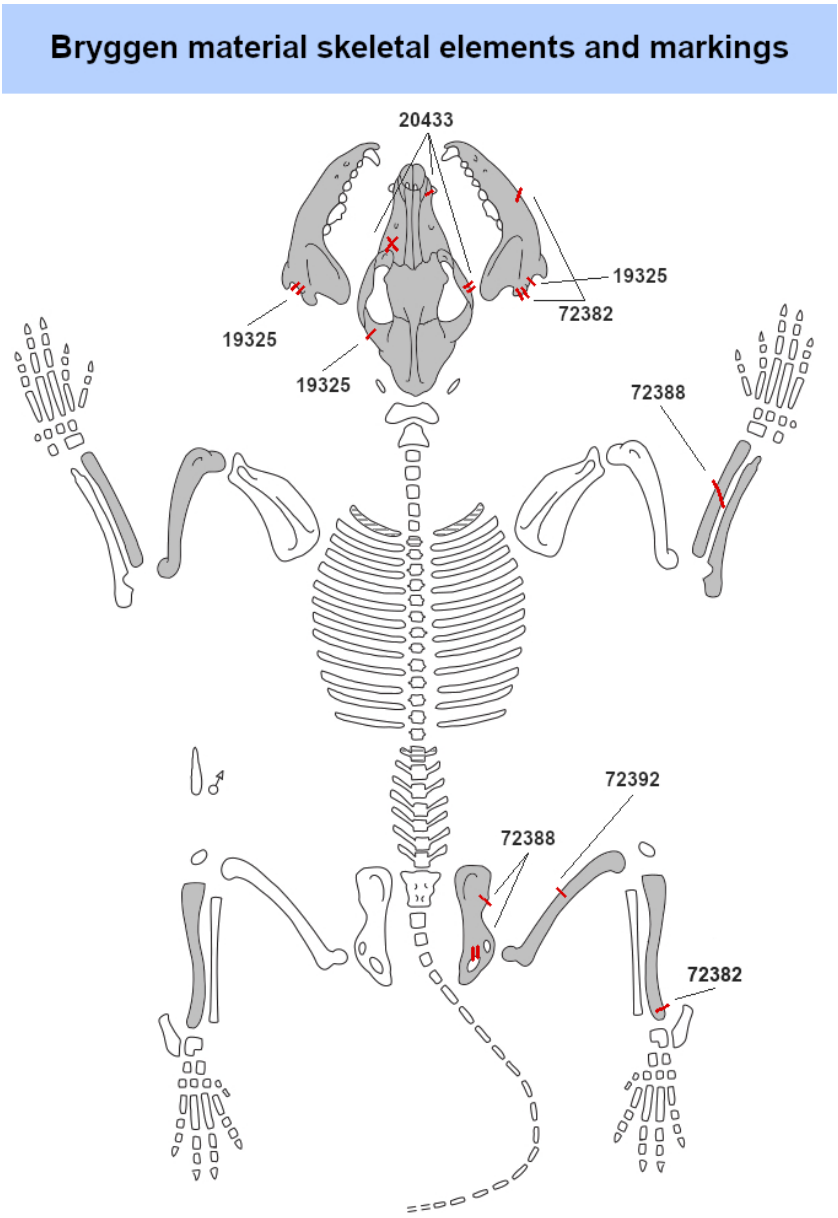


Figure 22: *Elements present in the selected Bryggen material (in grey), as well as potential elements present coloured in striped (present were also teeth not marked here). Markings found on the bones are marked by red lines, lines going all the way through the bone representing the bone being chopped off from the rest, and the cross indicated a blow/puncture.*

Bryggen height reconstructions

Location	Reg. no.	Element	Length (mm)	Rec. height (mm)	Age class (young / adult)
Bryggen 1970	71922	RAD	85,46	291,27	y
Bryggen 1970	71922	HUM	93,25	293,31	y
Bryggen 1970	72382	TIB	172,5	494,29	a

Table 33: *Elements from Bryggen in which one could do height reconstruction calculations from, and the results. (Table by author).*

The three skeletal elements from Bryggen suitable for height reconstructions fall into the small-, and medium-sized-dog groups. The two first elements are likely to belong to the same individual (based on similar size and being under the same registration number). This individual, registered as [71922], falls into the small-sized group. It seems to be a young individual, as the humerus has clear fuselines (approximately 5-12 months of age). The tibia of the other individual, an adult registered as [72382], would belong in the medium size group. As this bone represents the only height reconstruction of an adult individual, it is the only indicator of Bryggen dog sizes, which also leaves us with no maximum, minimum, nor average height for this location.

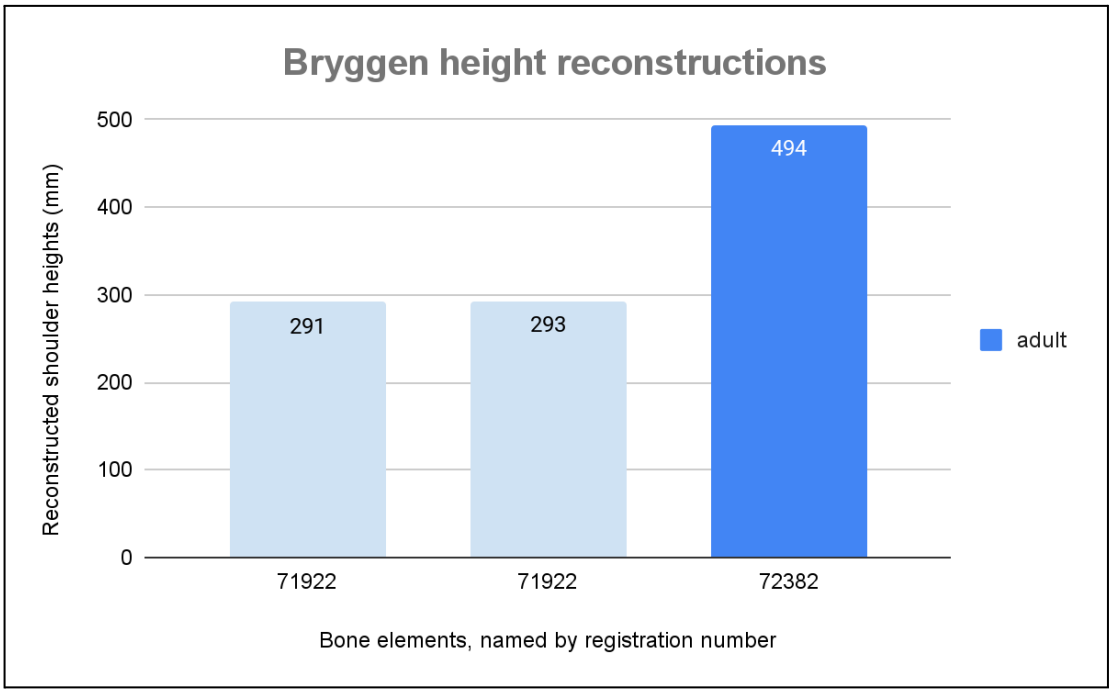


Figure 23: *Graph showing the reconstructed shoulder heights of the three measurable long bones from the selected Bryggen material. All three stem from the Bryggen 1970 excavation.*

5.2.1.1.2 Dreggen

From the location named Dreggen (museum number JS.630) 36 fragments (NISP) were analysed, with an estimated MNI of 26. This location was not included in Hufthammer's analysis of Bryggen Dogs. This as it had already been analysed by Undheim (1985). Undheim registered 25 bones of *Canis familiaris* (as well as four additional Canidae bones). In comparison to Undheim, I found there were a further 11 fragments in the collection (1 SKL, 1 SCP, 1 HUM, 1 RAD, 7 TTH). Perhaps Undheim was referring to MNI, and thus the difference would only be at one.

Dreggen dogs (NISP)							
Element	Amount of frags.	Tool marks	Potential tool marks	Path-ology	Potential path-ology	Gnaw marks	Potential gnaw marks
SKL	4	1	3	1	2		

MAN	6				1		
TTH	7						
SCP	3						1
HUM	5	1	2				2
ULN	3	2	1				2
RAD	3		1				
FEM	3	1					1
TIB	2		1			1	
SUM	36	5	8	1	3	1	6
%	*100*	*13,9*	*22,2*	*2,8*	*8,3*	*2,8*	*16,7*

Table 34: *Complete Dreggen material, as analysed by the author. The number of the different elements present, as well as on how many of them there have been found markings. (Table by author).*

In the Dreggen material, I registered five accounts of clear tool marks, as well as eight more potential ones. As for pathology, I registered three clear cases, as well as one additional potential one. And for gnaw marks, I found three clear accounts, as well as four more, potential ones.

Dreggen individuals with (potential) markings								
Museum (JS) no.	Fragment ID	Skeletal element	Tool marks	Potential tool marks	Pathology	Potential pathology	Gnaw marks	Potential gnaw marks
630	B-305, 83/5732	SKL	x		x			
630	B-305, 83/5731	SKL		x				
630	B-305, 83/5731	MAN				x		
630	A-336, 83/6160	SKL		x		x		

630	B-5, 83/4918	SKL		x		x		
630	A-560, 83/5636	HUM	x					
630	B-282, 83/4334	ULN	x					x
630	A-301, 83/5504	ULN	x					
630	A-325, 83/5974	TIB		x				
630	A-154, 83/3118	FEM?						x
630	A-226, 83/3552	FEM	x					
630	A-565, 83/5684	SCP						x
630	A-565, 83/5684	HUM		x				x
630	B-22, 83/584	RAD		x				
630	B-272, 83/3498	HUM		x				x
630	B-30, 83/984 986	TIB					x	
630	A-565, 83/6014	ULN		x				x

Table 35: *Markings found in the dog derived skeletal elements of Dreggen. The elements containing the markings and potential markings are listed by registration number. (Table by author).*

Figure 24 (left): *Skull [B-305, 83/5732] of a Dreggen individual who possibly suffered a blow to the skull. Said blow, or other damage present in the skull, could be linked to the individual's cause of death.* **Figure 25 (right):** *Another view of the same skull [B-305, 83/5732], showing clear pathological signs left from what seems to have been tooth rot or similar oral health problems suffered during lifetime.*

Figure 26 (left): *Ulna [A-301, 83/5504] with clear cut marks around what would have been the mid-shaft of the bone. Potentially this proximal ulna fragment was cut off from the rest of the bone, using a fine-bladed tool like a knife.* **Figure 27 (right):** *Small Dreggen scapula [B-304, 83/5701] (right), next to the scapula of a modern male red fox [3912]. The small Dreggen individual has a scapula that closely resembles the size of that of a modern male red fox.*

Figure 28 (left): *Mandible [B-272, 83/3497] (bottom) next to a mandible of a comparative female red fox [B.157]. Even with parts of the Dreggen mandible missing, one can tell that the individual has an even smaller mandible than the modern red fox (minding that the morphology of these species differ). This mandible might represent a young individual. A second small mandible, with some unerupted teeth, were also found at Dreggen; [A-228, 83/3609].* **Figure 29 (right):** *Skull [A-336, 83/6160] (top) next to a comparative skull half of a male German Shepherd [H.396]. The Dreggen skull in question is slightly bigger and more robust than the modern German Shepherd skull.*

By the material derived from Dreggen we can tell, by looking at the skeletal remains alone, that there have been small dogs as well as medium-to-large dogs present. A range from as small as the modern red fox, and as big as slightly larger than a modern German Shepherd. From this location there are three skulls bearing clear signs of pathologies (presumably tooth rot related), showing it might have been relatively common for the Dreggen dogs to have had oral health problems. The presence of tool marks, like skull punctures, cut marks, and a partitioned long bone, might tell of use of the dogs for the likes of their pelt or meat. The case for the specimen of skull [B-305, 83/5732] might have been a mercy kill, as it in addition to a blow to the head has a lot of oral health pathologies. Still, it seems just as likely to have been killed off for its potential resources; activities witnessed by marks on other skeletal elements of Dreggen.

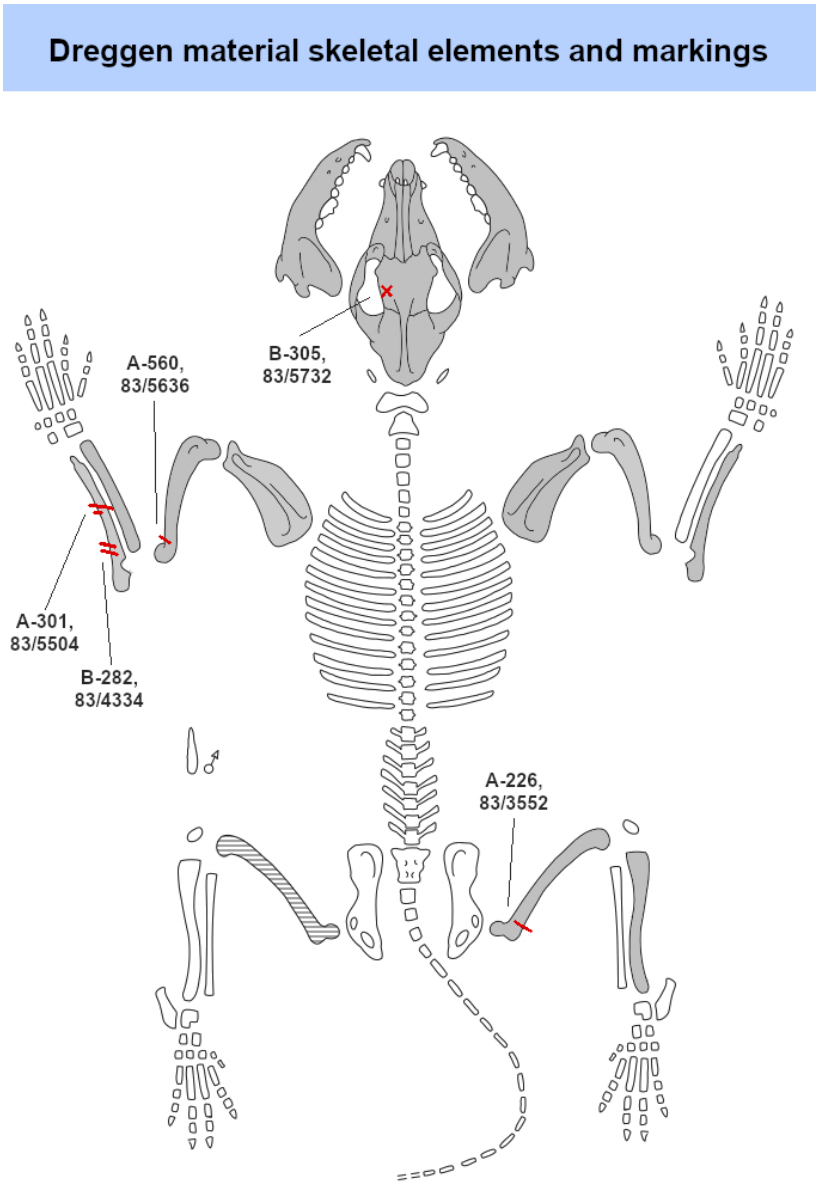


Figure 30: *Skeletal elements present in the Dreggen material coloured in grey, as well as potential elements present coloured in striped (present were also teeth not marked here). Red lines represent approximate placement of the markings found, and cross represent blow/puncture.*

Dreggen height reconstructions				
Reg. no.	Element	Length (mm)	Rec. height (mm)	Age class (young / adult)

B-305, 83/5792	HUM	104,12	330,59	a
B-305, 83/5792	RAD	100,59	339,39	a
A-560, 83/5636	HUM	109,01	347,36	a
A-565, 83/5684	HUM	121,90	391,58	a
A-565, 83/6014	ULN	139,75	394,72	a
A-565, 83/5684	RAD	119,90	400,79	a
A-226, 83/3552	FEM	152,76	466,71	a

Table 36: *Elements from Dreggen in which one could do height reconstruction calculations from, and the results. Listed from shortest to tallest reconstructed height. (Table by author).*

There were seven long bones from Dreggen I could conduct height reconstructions of. All of them had fused epiphyses, indicating adult individuals. Five of these are within the small size group, and two of them go within the medium category. The two individuals that fit in my medium category still belong in the shorter end of the group, and thus no bigger medium sized dogs nor large category dogs are present in the Dreggen material conducted height reconstructions off of. This can be seen as an indication of most Dreggen dogs potentially belonging in the upper end of the small category, to the lower end of the medium category. Still, it is highly likely that larger dogs also existed on site, as e.g. the large skull of [A-336, 83/6160] bear witness of (nevertheless, keeping in mind that skull size-to-height ratios in dogs can vary a lot). As for the bones conducted height reconstruction off of, the average height comes in at 382 mm.

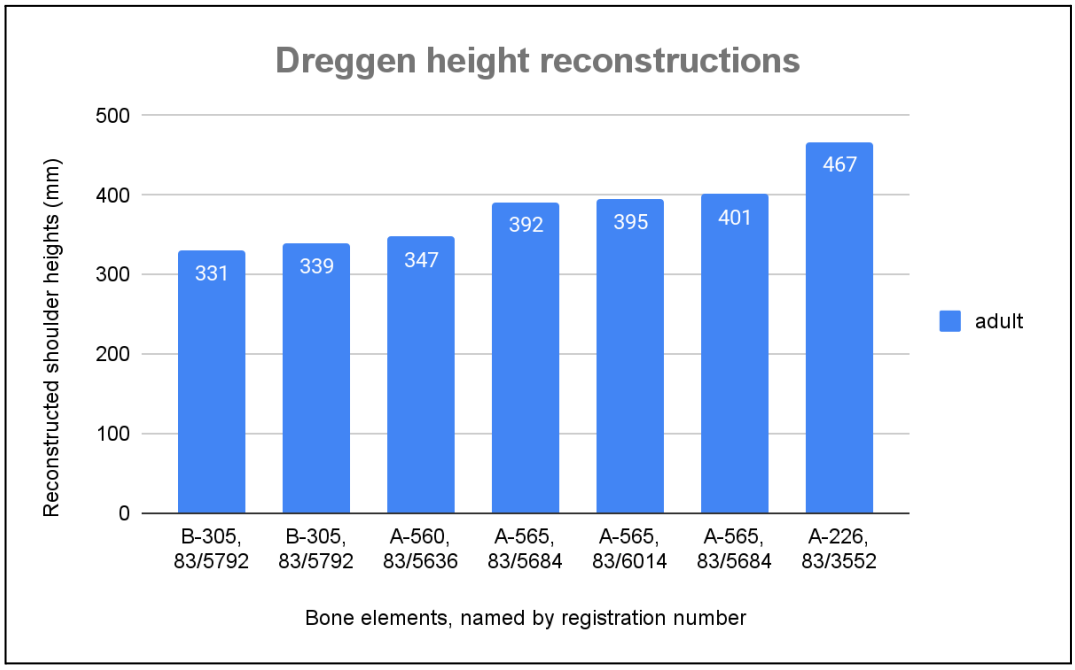


Figure 31: *Graph showing the reconstructed shoulder heights of the seven measurable long bones from Dreggen. All seven of them fit in the upper end of the small category to the lower end of the medium category.*

5.2.1.2 Trondheim

Below I will present my own data collected on the chosen material of Trondheim.

5.2.1.2.1 Folkebibliotekstomten

Lie reports of 10 bones of *Canis familiaris*, in contrast to my analysis of only six. Since Lie's reporting it seems four dog bones (1 SKL, 1 ULN, 2 TIB) have since been removed from the collection marked *Canis familiaris* from FBT (museum no. JS.765). As for the six bones still present, my estimated MNI is five.

Folkebibliotekstomten dogs (NISP)							
Element	Amount of frags.	Tool marks	Potential tool marks	Path-ology	Potential pathology	Gnaw marks	Potential gnaw marks

HUM	1						
RAD	1		1				
FEM	1						
TIB	3		2				
SUM	6		3				
%	*100*	*0*	*50*	*0*	*0*	*0*	*0*

Table 37: *FBT material, as analysed by the author. The number of the different elements present, as well as on how many of them there have been found markings. (Table by author).*

From Folkebibliotekstomten we have a NISP of dogs at only six. All of them long bones, and half of them tibiae. The three accounts of potential tool marks were the only markings identified in the material. Being a very sparse material, we can not talk about norms nor patterns present. We can only get a small glimpse of what was once present at the site.

FBT individuals with (potential) markings								
Museum (JS) no.	Fragment ID	Skeletal element	Tool marks	Potential tool marks	Pathology	Potential pathology	Gnaw marks	Potential gnaw marks
765	N.93461	RAD		x				
765	N.959226	TIB		x				
765	N.95938	TIB		x				

Table 38: *Markings found in the dog derived skeletal elements of FBT. The elements containing the markings and potential markings are listed by registration number. (Table by author).*

Figure 32 (left): *Shortest tibia recorded [138] (bottom) of the locations dealt with in this thesis stems from FBT.* **Figure 33 (right):** *Longest recorded radius [433] (top) of the locations dealt with in this thesis stems from FBT.*

Figure 34: *Longest recorded humerus [1136] (top) of the locations dealt with in this thesis stems from FBT.*

As for the pictures above, both the shortest recorded tibia, of the shortest recorded individual, as well as the longest recorded radius and longest recorded humerus of the complete

collection analysed in this study, stem from FBT. The short tibia did, nevertheless, turn out to be from a young individual.

As for the illustration below (**figure 35**), all six bones from FBT were identified down to element and side (sin/dex). There are two left tibias, the rest of the marked skeletal elements represent singular bones. In regards to markings, no certain ones could be identified, and are thus not present in the illustration. This could either mean it was not common to use dogs as resources at the given location, or it could be the case that the few bones we have do not represent the full picture of the site activities regarding dogs. I would guess the latter.

FBT material skeletal elements and markings

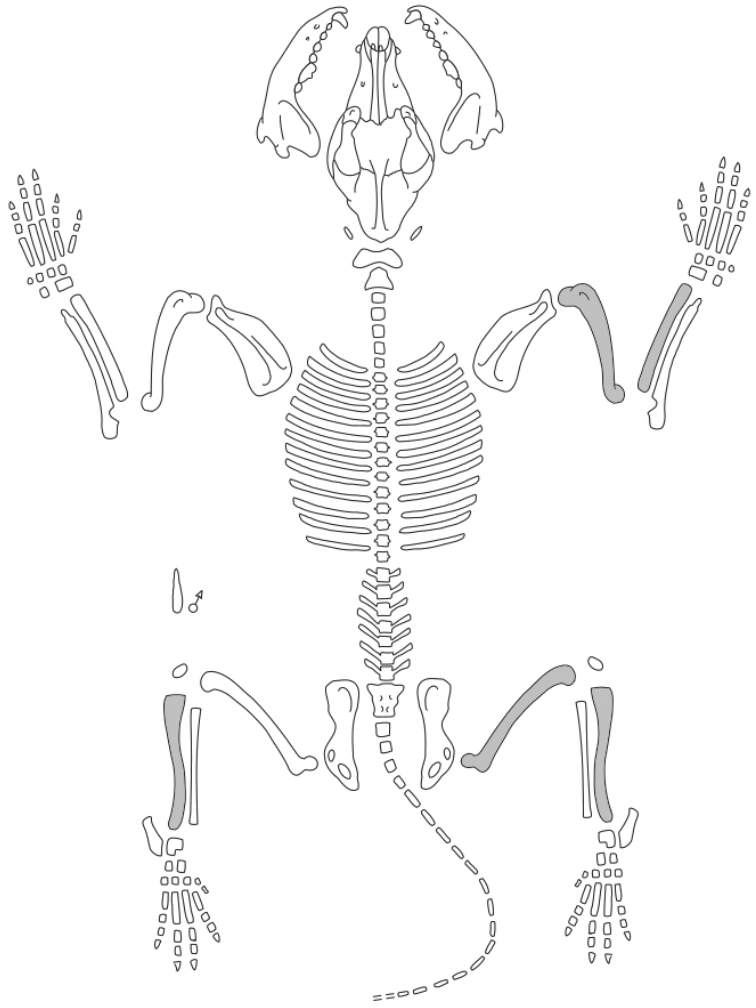


Figure 35: *Skeletal elements present in the Folkebibliotekstomten material coloured in grey. No definite tool marks were found in the FBT material.*

FBT height reconstructions				
Reg. no.	Element	Length (mm)	Rec. height (mm)	Age class (young / adult)
138	TIB	73,51	205,24	y
1136	TIB	132,69	378,04	y?
1136	HUM	124,11	399,16	y
433	RAD	131,53	437,78	a
1136	TIB	158,00	451,95	a

Table 39: *Elements from Folkebibliotekstomten in which one could do height reconstruction calculations from, and the results. (Table by author).*

The dogs of FBT belong to the upper half of the small category, as well as to the lower end of the medium size category. The same range of dog sizes as seen in the Bryggen and Dreggen material. The [1136] tibia reconstructed to 378 mm seems to possibly belong to the same individual as the [1136] humerus, measuring in at a reconstructed height of 399 mm. One bone from FBT stands out from the rest; the very small tibia of [138], at a reconstructed shoulder height of a mere 205 mm. This individual represents the smallest one of the chosen material for this study. The small size is likely to be linked to the fact that this tibia belonged to a very young specimen, as the epiphyses of the bone is missing. This would indicate an individual at below the tibial fusion age of 5-12 months. The humerus of [1136] also stems from a young individual, with an unfused (missing) proximal epiphysis, and a distal epiphysis with clear fuse lines. This would place said individual at somewhere between 5-8 to 10-12 months of age. As this humerus is thought to belong to the same individual as one of the [1136] tibiae, this would leave us with half the FBT bones stemming from young individuals. Counting the only two measurable long bones stemming from adults, the average height of the FBT dogs is 445 mm.

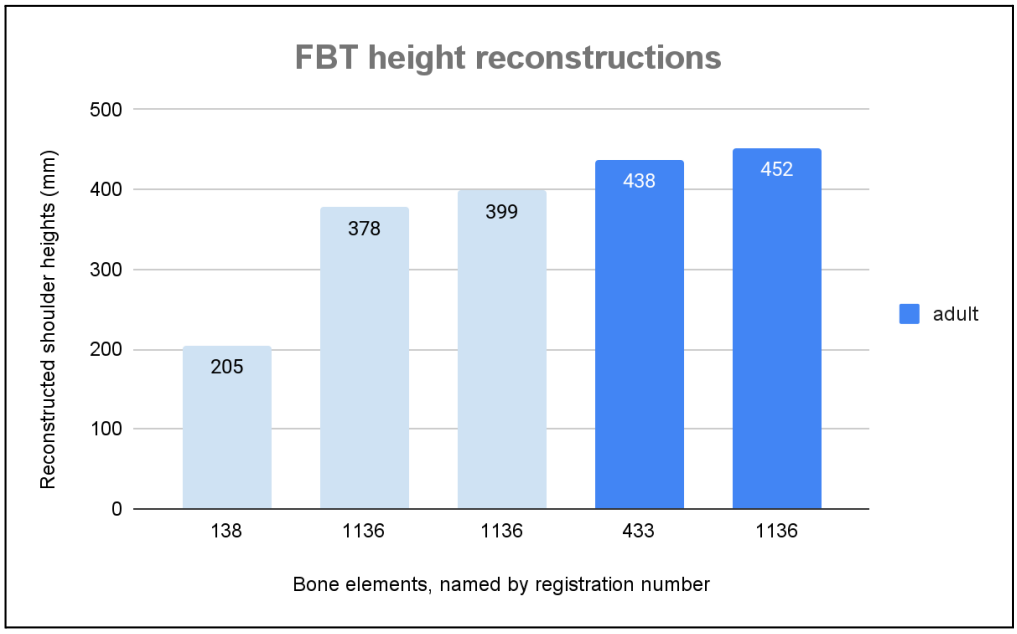


Figure 36: *Graph showing the reconstructed shoulder heights of the five measurable long bones from Folkebibliotekstomten. Presumably, only the two tallest individuals were adults.*

5.2.1.2.2 Televerkstomten

Marthinussen (1992) reported of 43 elements of *Canis familiaris*. I, in comparison, have only been presented with 24 elements to analyse. The 19 elements that make up the difference here (1 SKL, 1 ATL, 9 VER, 1 HUM, 3 ULN, 1 SAC, 1 FEM, 1 TIB, 1 PHA) are no longer present. As for the 24 elements analysed, the presumed MNI is 21.

Televerkstomten dogs (NISP)							
Element	Amount of frags.	Tool marks	Potential tool marks	Path-ology	Potential pathology	Gnaw marks	Potential gnaw marks
ATL	2	1					
VER	2						
SCP	2		2				
HUM	2	2					

ULN	2		1				
RAD	3	1	1				
FEM	4	1	2				
TIB	6	1	4				
FIB	1						
SUM	24	6	10				
%	*100*	*25*	*41,7*	*0*	*0*	*0*	*0*

Table 40: *TVT material, as analysed by the author. The number of the different elements present, as well as how many of them there have been found markings on. (Table by author).*

As for markings, clear tool marks were found on six of the TVT dog bones, as well as an additional ten potential ones. If the potential tool marks are indeed such markings, this would mean two thirds of the TVT bones have been worked by humans. No pathologies nor gnaw marks were identified on the skeletal elements of this site.

TVT individuals with (potential) markings								
Museum (JS) no.	Fragment ID	Skeletal element	Tool marks	Potential tool marks	Pathology	Potential pathology	Gnaw marks	Potential gnaw marks
632	N.49822	TIB		x				
632	N.49302	HUM	x					
632	N.49308	TIB		x				
632	N.49551	SCP		x				
632	N.49551	FEM		x				
632	N.49968	TIB		x				
632	N.49350	ATL	x					
632	N.49261	ULN		x				
632	N.49353	FEM		x				
632	N.49566	TIB		x				

632	N.49151	RAD	x					
632	N.49969	TIB	x					
632	N.49312	SCP		x				
632	N.49660	HUM	x					
632	N.49660	RAD		x				
632	N.49660	FEM	x					

Table 41: *Markings found in the dog derived skeletal elements of TVT. The elements containing the markings and potential markings are listed by registration number. (Table by author).*

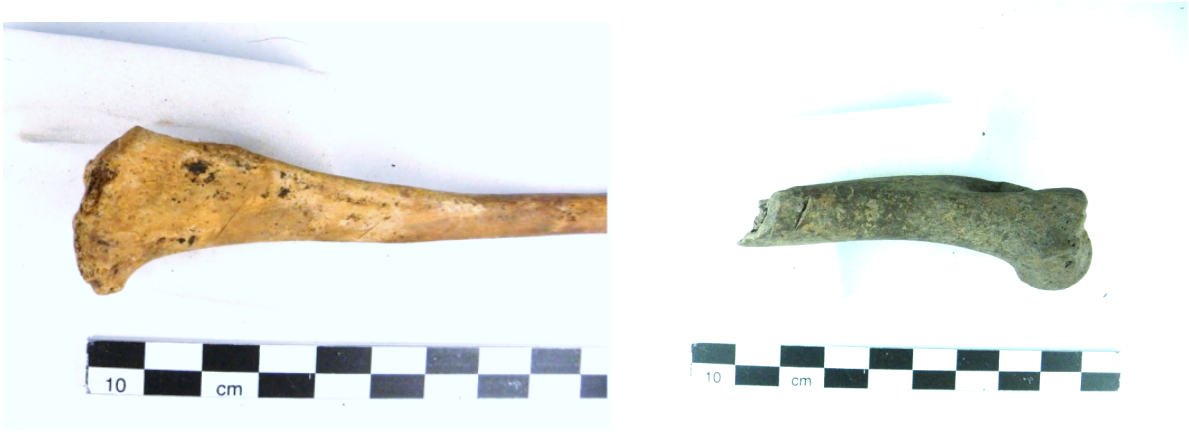


Figure 37 (left): *Proximal end of tibia [404] with at least two clear cut marks to the proximal half of the bone.* **Figure 38 (right):** *Distal end of humerus [286] with two chopmarks, where the latter one has parted the bone from its other (missing) half.*

Figure 39 (left): *Two fragments of an atlas of a big individual [417], showing clear butchery marks.* **Figure 40 (right):** *Tibia [1008] (top) representing the longest complete tibia in the material included in this study. Height reconstruction gives an estimated shoulder height of 570 mm for this individual. The tallest of the measurable individuals of TVT.*

For the Televerkstomten material we can clearly see how the dogs have been utilised as material resources, through both cut and butchery marks. As both types of tool marks are present, the dogs of TVT could have been used for both meat and pelts. One can not for sure know whether or not the pelts were kept as part of the resulting material of the processing, but the presence of butchery marks are assumed to indicate meat retrieval. The split atlas of [417] is believed to be a result of decapitation. As for the tibia of [1008], it represents the tallest individual out of all the tibiae possible to conduct height reconstruction of from the entire collection included in this study, coming in at approximately 570 mm tall (belonging in the medium size group).

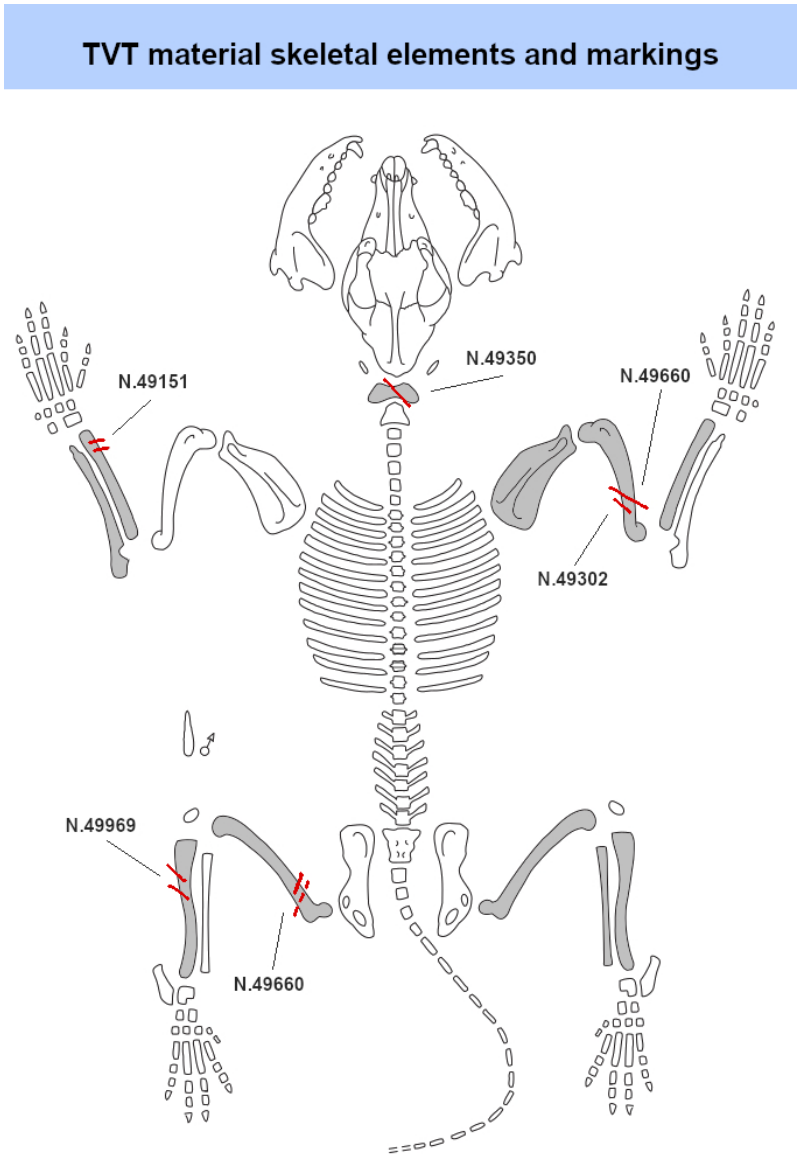


Figure 41: *Skeletal elements present in the Televerkstomten material coloured in grey, as well as potential elements present coloured in grey stripes (two vertebral elements). Red lines represent approximate placement of the markings found (lines going all the way through the bone being butchery marks, the others cut marks), and dashed line represent a potential butcher mark.*

TVT height reconstructions				
Reg. no.	Element	Length (mm)	Rec. height (mm)	Age class (young / adult)

404	TIB	117,59	333,95	a?
404	TIB	119,95	340,84	a
338	TIB	136,27	388,50	a
233	RAD	128,76	428,97	a
1008	TIB	198,50	570,21	a

Table 42: *Elements from Televerkstomten in which one could do height reconstruction calculations from, and the results. (Table by author).*

As for the height of the TVT dogs, we yet again see height reconstructions landing at the upper end of the small grouping, as well as the lower end of the medium grouping. This time reaching a little higher on the medium scale than the previously accounted for locations, with the 570 mm tall individual. The two tibiae both registered as [404] might very well be from the same individual. This as one of them is of the left side of the body, and the other of the right, and they are registered under the same number, and come close in reconstructed height. All TVT bones conducted shoulder height reconstructions of off seems to stem from adult individuals, based on epiphyseal fusion, and the average height is 412 mm.

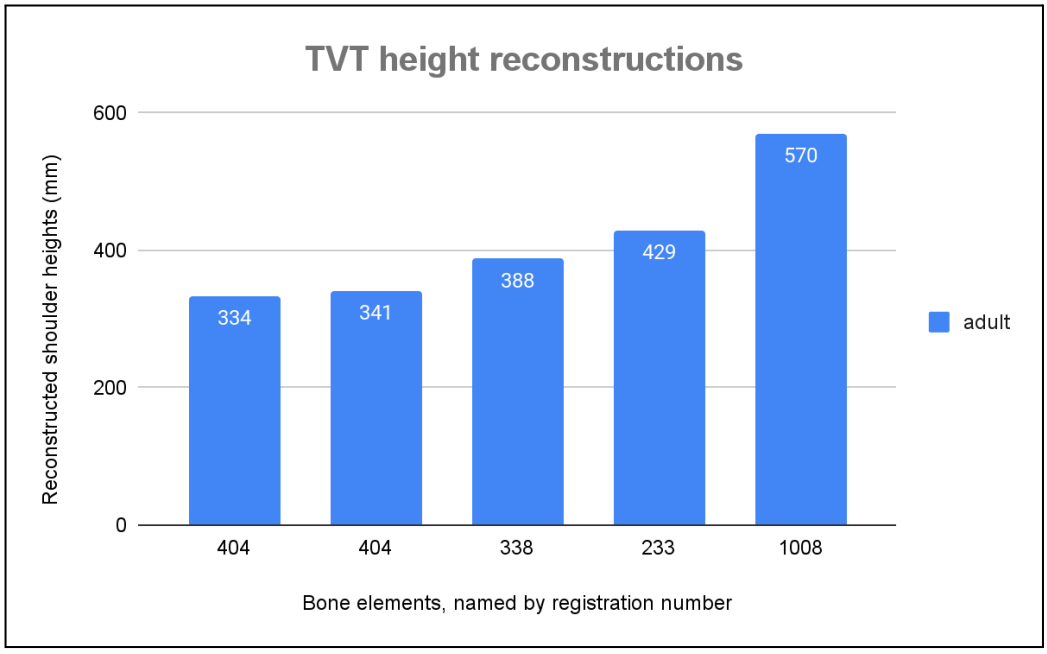


Figure 42: *Graph showing the reconstructed shoulder heights of the five measurable long bones from Televerkstomten.*

5.2.1.2.3 Erkebispegården

The zooarchaeological material from EBG was analysed by Hufthammer (1999). There it was reported of 61 dog bone fragments. My analysis was conducted on 52 fragments. Nine fragments differ between my analysis and the analysis of 1999 (as the former study does not list the dog fragments by skeletal element, I can not know which are potentially missing in my analysis). The difference in NISP can be caused by a variety of things. E.g., it might reflect differences in methodology of counting elements, bones might have been displaced, or maybe lent out without a note being left behind in the archives. My estimate of the MNI for the EBG material is 45.

Erkebispegården dogs (NISP)							
Element	Amount of frags.	Tool marks	Potential tool marks	Path-ology	Potential pathology	Gnaw marks	Potential gnaw marks
MAN	6		4		1		
TTH	5						
VER	6						
RIB	1		1				
SCP	3		1				
INN	1						
HUM	6		4				
ULN	2						
TAR	1						
MTC	4		1				
PHA	1		1				

RAD	5		3				
FEM	3		2				
TIB	4		1				
FIB	3						
MTT	1						
SUM	52		18		1		
%	*100*	*0*	*34,6*	*0*	*1,9*	*0*	*0*

Table 43: *EBG material, as analysed by the author. The number of the different elements present, as well as how many of them there have been found markings on. (Table by author).*

As for markings on the EBG material, no clear accounts were found. A lot of potential tool marks were registered, but would need further analysis to ascertain. If these are all indeed tool marks, it would mean just over one third of the EBG material has such marks. As for pathology, one potential case was identified in one of the EBG mandibulas. This would, too, need further investigation to determine. No gnaw marks were found in the material of this location.

EBG individuals with (potential) markings								
Museum (JS) no.	Fragment ID	Skeletal element	Tool marks	Potential tool marks	Pathology	Potential pathology	Gnaw marks	Potential gnaw marks
845	118174	RIB		x				
845	121393	MAN		x				
845	121393	MAN		x				
845	119099	PH		x				
845	120023	SCP		x				
845	138378	MAN		x				
845	137484	MAN		x				
845	118515	HUM		x				

845	117645	HUM		x				
845	117614	FEM		x				
845	115686	RAD		x				
845	114738	FEM		x				
845	119946	MC		x				
845	120222	RAD		x				
845	121476	TIB		x				
845	120130	RAD		x				
845	120130	HUM		x				
845	120130	HUM		x				

Table 44: *Markings found in the dog derived skeletal elements of EBG. The elements containing the markings and potential markings are listed by registration number. (Table by author).*

Figure 43 (left): *The large mandible of [138376] (bottom) next to the mandible of comparative wolf [B.20] (top).* **Figure 44 (right):** *The massive mandibles of [137484] and [138378].*

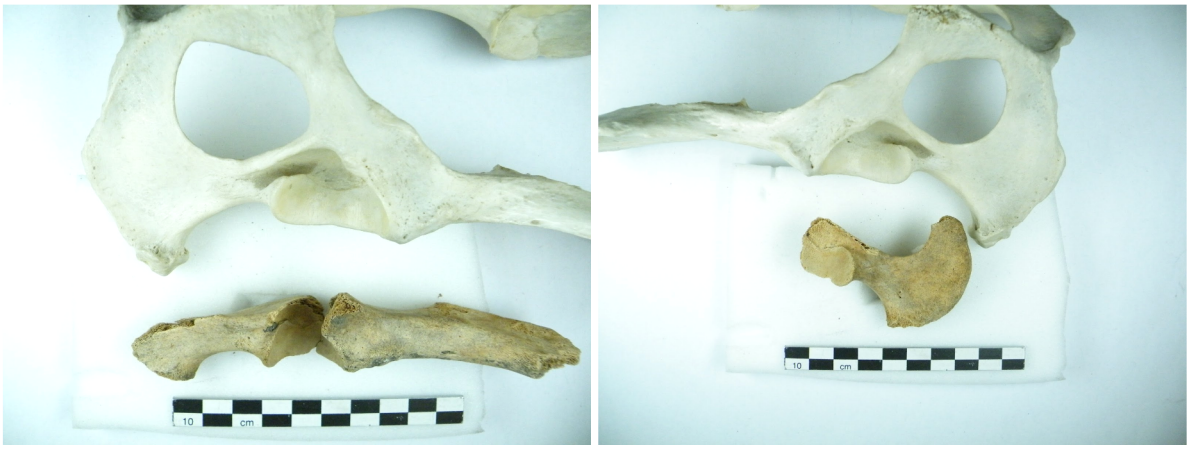


Figure 45 (left): *The two fragments of innominate [119943] (bottom) that fit together, next to the innominate of comparative wolf [B.2], of a similar size.* **Figure 46 (right):** *Innominate fragment of [119943] (bottom) next to the innominate of comparative wolf [B.2], of a similar size.*

At EBG we see the remains of some quite large individuals. They are comparable to the size of modern grey wolves (*Canis Lupus*). The innominate fragments might be slightly smaller than the wolf they were compared to. Mandible [138376] seem to be pretty much the same size as comparative wolf [B.20], while the two mandibles of [137484] and [138378] seem to be even more massive than that of a modern wolf (minding the morphological differences).

As for skeletal elements, the EBG material is diverse, representing many different bones of the dog skeleton (see **Figure 47** below). Nevertheless, no skulls were part of the material. The large amount of long bones found at the site makes for a good sampling of shoulder height reconstruction of the EBG dogs (see **Table 45** below). As for markings, as mentioned, no clear traces were found, and there are thus no red lines representing such findings in the illustration below.

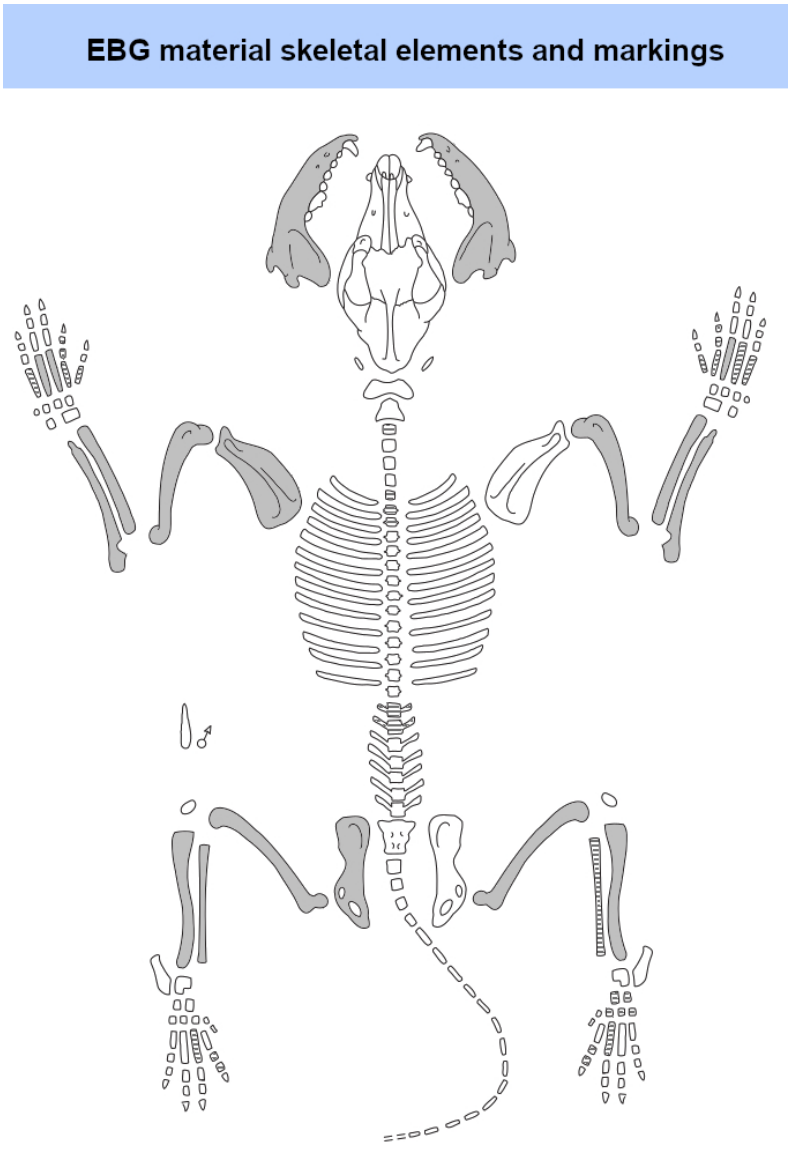


Figure 47: *Skeletal elements present in the Erkebispegården material coloured in grey, as well as potential elements present coloured in grey stripes (among them skeletal elements of the feet, in which I could not quite figure which limb it stemmed from, as well as some vertebra elements it was hard to determine the number of). No clear markings were found in the EBG material.*

EBG height reconstructions				
Reg. no.	Element	Length (mm)	Rec. height (mm)	Age class (young / adult)

121371	TIB	95,5	269,45	y?
119946	FEM	128,0	388,96	a
121476	TIB	145,0	413,99	a
115992	RAD	128,3	427,50	a
120109	RAD	129,8	432,27	a
115990	ULN	188,0	528,85	a

Table 45: *Elements from Erkebispegården in which one could do height reconstruction calculations from, and the results. (Table by author).*

The shortest tibia of [121371] is found to possibly be unfused, and thus might belong to a young individual. The rest of the long bones conducted shoulder height reconstructions of from EBG are presumed to stem from adults. As for the height of the EBG dogs, they too belong in the upper end of the small category, as well as the lower end of the medium category. The average height (not counting the potentially young individual) of EBG is 438 mm. Looking at the large mandibles and pelvic bones from the location, these bones represent individuals potentially belonging to the upper end of the medium category, if not even the large category.

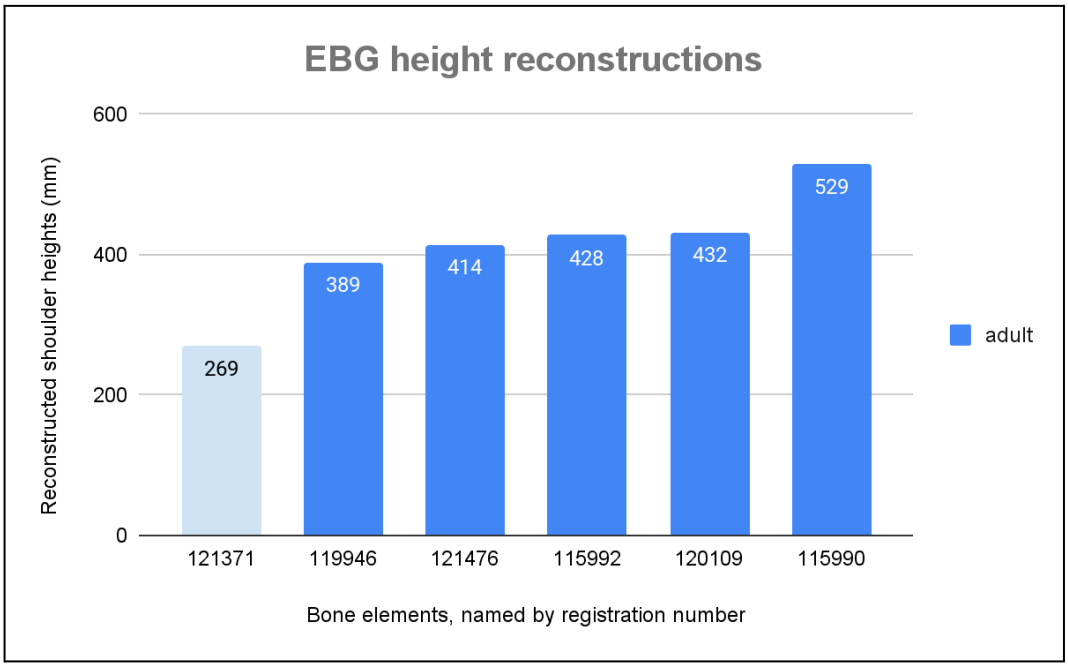


Figure 48: *Graph showing the reconstructed shoulder heights of the six measurable long bones from Erkebispegården.*

5.2.2 Iceland

Below the new data collected on the chosen material of Iceland will be presented. The Icelandic material derives from the two sites of Gásir and Oddstaðir, both located in the Eyjafjörður area in the north of the island. This material was re-analyzed for this study, to see if it would be possible to retrieve more information from the dog bones using methods limited to macro analyses.

5.2.2.1 Gásir

Harrison (2009) reported of 15 fragments, and an estimated MNI of 11, of *Canis familiaris* from Gásir. Through my analysis, I arrived at 44 fragments (NISP), and an MNI of 19. An obvious reason for some of these differences in numbers is how I have counted each tooth as a separate element (to revisit the methodology used, see **chapter 4**).

Gásir dogs (NISP)							
Element	Amount of frags.	Tool marks	Potential tool marks	Path-ology	Potential pathology	Gnaw marks	Potential gnaw marks
SKL	3			1			
MAN	5						
TTH	24						
VER	1						
SAC	1						
HUM	4						
ULN	2						
RAD	1						
TIB	1						
ATL	1						
SCP	1						
SUM	44			1			
%	*100*	*0*	*0*	*2,3*	*0*	*0*	*0*

Table 46: *Gásir material, as analysed by the author. The number of the different elements present. Due to heavy surface erosion, no markings were noticeable on the Gásir material. (Table by author).*

Regarding markings on the Gásir bones, they all have extensive surface erosion. This made it very hard to distinguish potential cuts, gnaw marks, etc. For material like this, the next step would be to take a closer look with a microscope, to potentially get more clear answers (for this study the material was only looked at with the naked eye, and details studied with a loupe, due to time limitations).

In regards to the size reconstruction of the Gásir long bones, we have the three calculations done by Harrison (2008)(revisit subchapter 5.1.4.1: Gásir). Based on her height

reconstructions, the average height of the Gásir individuals is 298 mm, and they would all be placed well within my size category of small. To further add to Harrison's work, I did a visual size comparison of the bones to the ones of individuals from the modern comparison collection. Below (**Figure 49** through **52**) one can see several of the Gásir bones next to modern bones from a Grey Norwegian Elkhound (female). The Norwegian Elkhound is a breed of medium size (avg. shoulder height of 49-52 cm), and one can tell the Gásir individuals must have been of a smaller size (NKK, 1997).

Gásir individuals with (potential) markings								
Museum (JS) no.	Fragment ID	Skeletal element	Tool marks	Potential tool marks	Pathology	Potential pathology	Gnaw marks	Potential gnaw marks
-	2812	SKL			x			

Table 47: *Markings found in the dog derived skeletal elements of Gásir. The element containing the markings is listed by registration number. (Table by author).*

Figure 49 (left): *Gásir humerus [2349] next to a humerus of comparative individual [3841].*
Figure 50 (right): *Gásir tibia [1551] next to a tibia of comparative individual [3841].*

Figure 51 (left): *Gásir scapula [3017] next to a scapula of a Norwegian Elkhound [3841].*
Figure 52 (right): *Gásir radius [3015] next to a radius of a Norwegian Elkhound [3841].*

Figure 53: *Picture showing probable pathology found in skull [2812] from Gásir.*

In the biggest skull piece of Gásir [2812], one can see some potential pathology around the tooth rows. One presumed case of pathology can be seen in the place where the left incisors have been sitting, where at least one of the holes (dental alveoli) for the teeth has been filled with bone growth (see **Figure 53** above). Judging by the teeth, it seems like an older individual who suffered from some severe dental issues.

When it comes to morphology, some of the long bones from Gásir seem to have somewhat of an s-curve to them (HUM [2812], TIB [1551]). This would place them in the category of the Dachshund-type small dog, rather than a straight-legged Pincher type of Hufthammer (1994).

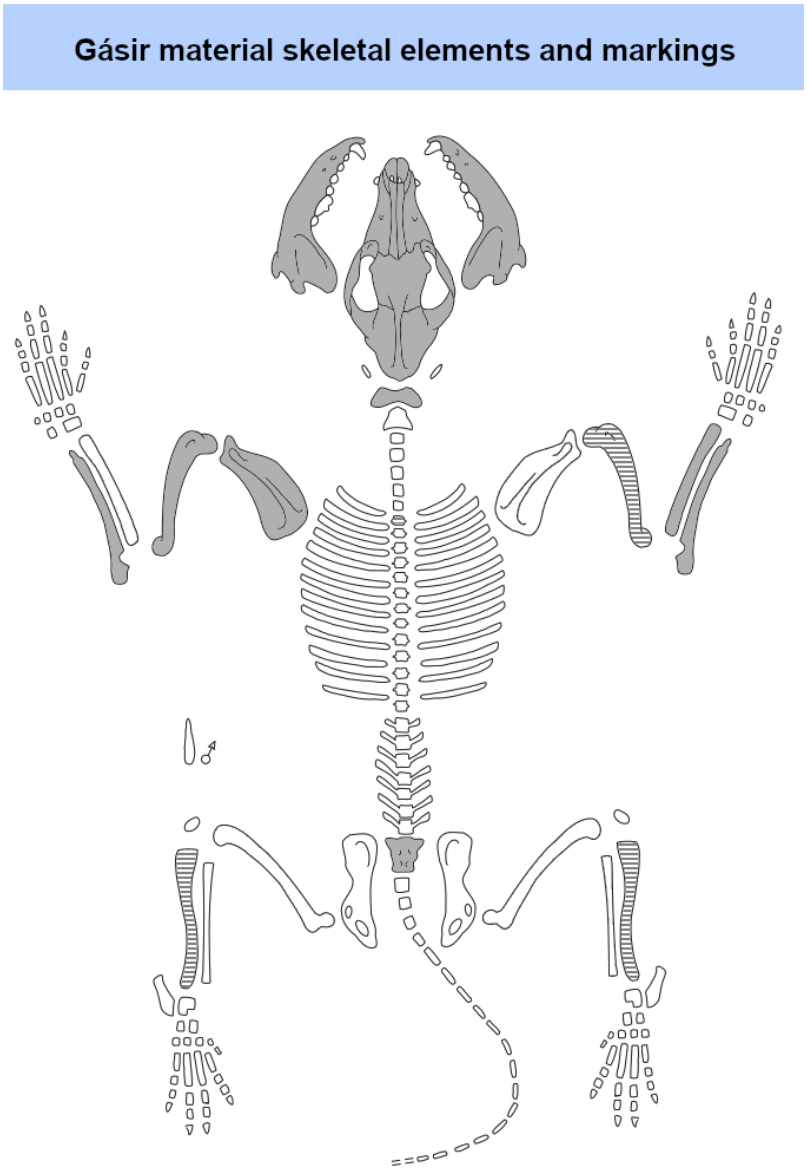


Figure 54: *Illustration showing the skeletal elements representing dogs from the Gásir location in Iceland (in grey), as well as potential elements present coloured in striped (present were also teeth not marked here). No definite markings could be identified, and are thus not drawn in.*

5.2.2.2 Oddstaðir

In Harrison's report (2012) she listed 1 individual (MNI), consisting of several fragments (2 x SKL, 1 x INN, 1 x LMV). I analysed 5 fragments (NISP) (see **Table 48** below), with an estimated MNI of 2. I saw no LMV in the material. For the MNI, the elements most likely stem from one individual.

Oddstaðir dogs (NISP)							
Element	Amount of frags.	Tool marks	Potential tool marks	Path-ology	Potential pathology	Gnaw marks	Potential gnaw marks
SKL	3						
INN	2						
SUM	5						
%	*100*	*0*	*0*	*0*	*0*	*0*	*0*

Table 48: *Oddstaðir material, as analysed by the author. The number of the different elements present. No markings, except from erosion, were found on the Oddstaðir material. (Table by author).*

Figure 55 (left): *The three skull fragments from Oddstaðir.* **Figure 56 (right):** *The two innominate fragments from Oddstaðir, shown fit together.*

The Oddstaðir material contained no long bones, and thus no measurements for height reconstructions could be obtained. To get an idea of the size of the individual, the bones were compared to elements from the modern comparison collection. As Harrison (2012, pp.44-46) compares the size of the Oddstaðir dog to that of (polar) foxes, I decided to look at the bones next to those of comparative foxes (*Vulpes vulpes*) available at UiB (see **Figure 57** and **58** below). From the comparisons, one can tell that the Oddstaðir dogs were slightly smaller than that of the modern red fox.

Figure 57 (left): *The larger piece of the Oddstaðir skull [108] next to the skull of a red fox [7530].* **Figure 58 (right):** *Oddstaðir innominate [108] next to the innominate of a red fox [3912].*

There are not many elements present that can tell us about the individual's age. There is nevertheless one tooth remaining in the largest skull fragment. Judging by the wear of this tooth, the dog was an adult. And as for morphology, it seems to be a dog of normal size ratios.

Regarding the presence of dogs at Oddstaðir: Harrison does not directly address it, but the gnaw marks left by dogs, on the bone material of Oddstaðir, mean there are traces of dogs being present in all phases but Phase 1 (late 9th century)(Harrison, 2012, tbl.7, pp.46). This could mean the residents had dogs at the farm from c. late 9th century up to the farm abandonment in c. late 14th century. This despite the only preserved dog skeletal element found being from the most recent phase (Phase 5: c. late 13th century - late 14th century).

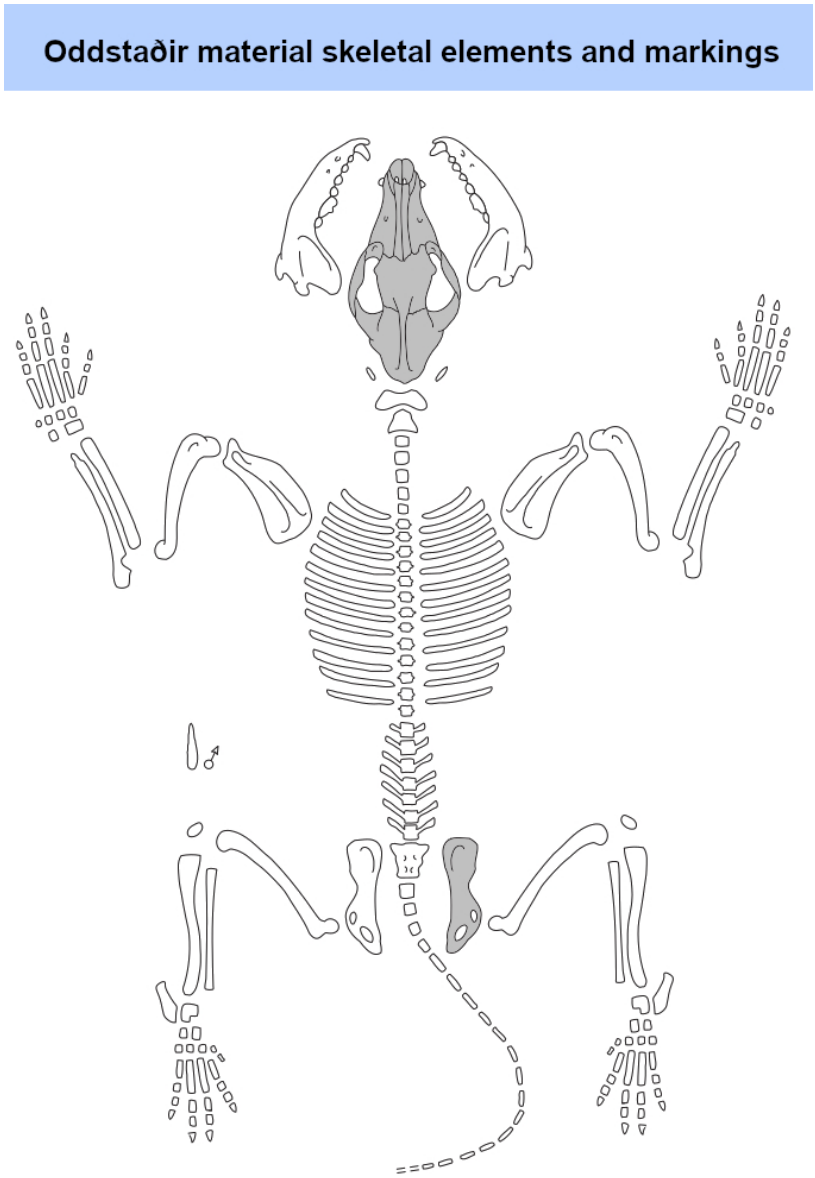


Figure 59: *Illustration showing the skeletal elements representing the dog from Oddstaðir (in grey). No definite markings could be identified, and are thus not drawn in.*

5.2.3 Comparisons of Locations

Following, some inter-sital comparisons will be presented, as well as some numbers on the material all together. This to have a closer look at potential similarities or differences present between the material of the different locations.

5.2.3.1. Shortest versus longest long bones

Elements representing the shortest and tallest individuals in the chosen collection (out of the long bones from which one could calculate shoulder height reconstructions from). Young and adult individuals were not distinguished for these physical comparisons. A corresponding element from the comparative collection (individual [3841], see **Appendix 5**) is presented as well, to better understand what sizes of dogs we are working with. It is, nevertheless, important to understand that these elements do not necessarily represent the smallest and biggest individuals in existence, just the shortest and tallest out of those whose approximate height could be found. These comparisons are based solely on my own GL measurements.

Humerus

The longest humerus in the material is [1136], and stems from a young individual of FBT in Trondheim. It measures a GL of 124 mm, and comes in at a reconstructed shoulder height of 399 mm. The shortest humerus in the material is [71922], and stems from Bryggen in Bergen. It measures a GL of 93 mm, and comes in at a reconstructed shoulder height of 293 mm.

Figure 60: *The longest and shortest humeri conducted height reconstruction off of. Top: comparative humerus from a modern Norwegian Elkhound [3841]. Centre: longest humerus, [1136] from FBT. Bottom: Shortest humerus, [71922] from Bryggen.*

Ulna

The longest ulna in the material is [115990], and stems from EBG in Trondheim. It measures 188 mm, and comes in at a reconstructed shoulder height of 529 mm. The shortest ulna in the material is [A-565, 83/6014], and stems from Dreggen in Bergen. It measures 140 mm, and comes in at a reconstructed shoulder height of 395 mm.

Figure 61: *The longest and shortest ulnae available for height reconstruction. Top: comparative ulna from a modern Norwegian Elkhound [3841]. Centre: longest ulna, [115990] from EBG. Bottom: Shortest ulna, [A-565, 83/6014] from Dreggen.*

Radius

The longest radius in the material is [433], and stems from FBT in Trondheim. It measures 132 mm, and comes in at a reconstructed shoulder height of 438 mm. The shortest radius in the material is [71922], and stems from Bryggen in Bergen. It measures 85 mm, and comes in at a reconstructed shoulder height of 291 mm.

Figure 62: *The longest and shortest radii available for height reconstructions. Top: comparative radius from a modern Norwegian Elkhound [3841]. Centre: longest radius, [433] from FBT. Bottom: Shortest radius, [71922] from Bryggen.*

Femur

The longest femur in the material is [A226, 83/3552], and stems from Dreggen in Bergen. It measures 153 mm, and comes in at a reconstructed shoulder height of 467 mm. The shortest femur in the material is [119946], and stems from EBG in Trondheim. It measures 128 mm, and comes in at a reconstructed shoulder height of 389 mm.

Figure 63: *The longest and shortest femora available for height reconstruction. Top: comparative femur from a modern Norwegian Elkhound [3841]. Centre: longest femur, [A226, 83/3552] from Dreggen. Bottom: Shortest femur, [119946] from EBG.*

Tibia

The longest tibia in the material is [1008], and stems from TVT in Trondheim. It measures 199 mm, and comes in at a reconstructed shoulder height of 570 mm. This tibia represents the tallest individual recorded in my material. The shortest tibia in the material is [138], and stems from a young individual of FBT in Trondheim. It measures 74 mm, and comes in at a reconstructed shoulder height of 205 mm. This tibia represents the shortest individual recorded in my material.

Figure 64: *The longest and shortest tibiae available for height reconstructions. Bottom: comparative tibia from a modern Norwegian Elkhound [3841]. Centre: Shortest tibia, [138] from FBT. Top: Longest tibia, [1008] from TVT.*

5.2.3.2 Height reconstruction data

The comparison of height reconstruction data of the dogs of the different locations was done by looking at the tallest individual (*Max.*), shortest individual (*Min.*), and average height (*Avg.*) of each location. The results can be seen in the figure below (**Figure 65**).

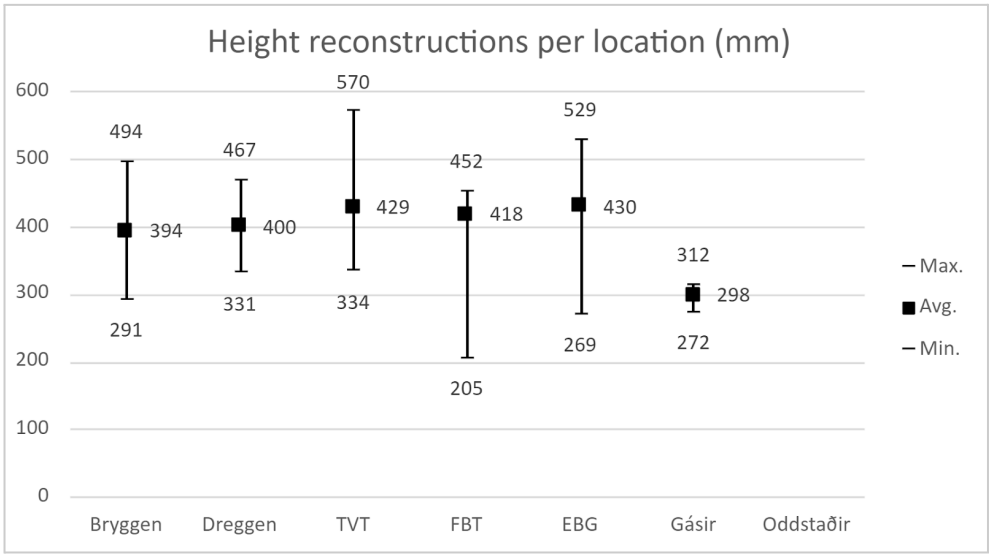


Figure 65: *Minimum, maximum, and average reconstructed shoulder heights for each of the locations, including the young individuals. The Gásir data is based on Harrison's results (2009, pp.19-20). For Oddstaðir there were no long bones present to conduct height reconstruction of.*

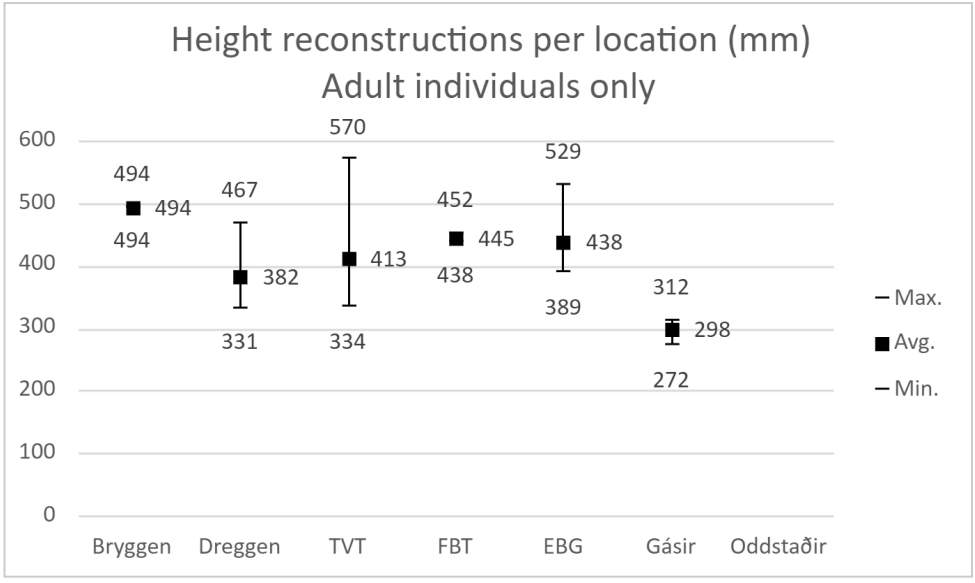


Figure 66: *Minimum, maximum, and average reconstructed shoulder heights for each of the locations, based on adult individuals solely. The Gásir data is based on Harrison's results (2009, pp.19-20). For Oddstaðir there were no long bones present to conduct height reconstruction of.*

One could sense a pattern in the dog heights already in analysing the material of the different locations separately; a trend of most individuals fitting within the c. 400-450 mm height span. This is again confirmed in the two foregoing charts (**Figure 65** and **66**). A slight outlier is the adult Bryggen individual, up at almost 500 mm, as well as the Gásir individuals down at c. 300 mm. The Dreggen average also seems to be slightly below the 400 mm mark, when only looking at adult individuals. As for the two different charts, one including the calculations of all measurable long bones, and the latter only including adult individuals, the last of the two will be the one to give us the most realistic picture of the dog sizes present. The size of a puppy, not knowing how big it would eventually grow, can not tell us too much without speculations of puppy-to-adult size growth rates and patterns (e.g.: Trangerud et al., 2007)(which has not been considered in this study).

5.2.3.3 Morphology

Here I will present my overall results in regards to morphological traits found in the analysed material. As explained in the Methods chapter (subchapter **4.4**), I have only registered morphological traits clearly visible to the eye, such as neoteny in skulls and excessive curvature in long bones.

S-shaped long bones

Excessive curvature of the long bones was potentially identified in a few individuals. However, without indepth research into this morphological trait, which is beyond the scope of this thesis, it is not possible for me to determine whether or not the curvature seen is more extreme than “normal”.

Neoteny

No cases of neoteny (shortened snout and high forehead) were found in the skulls of the selected material.

5.2.3.4 Pathology

Dogs of several locations seem to have suffered some health issues (all through tooth decay or similar oral health issues). Dog remains from Dreggen, and Gásir provide each at least one example of clear pathology, with specimens from Bryggen, and EBG recorded with potential pathologies. Dog remains from FBT, TVT, and Oddstaðir proved no signs of visible pathologies. As all pathologies identified in the archaeofaunal material were found in skulls and mandibles, this could explain the reason why pathologies were not seen in collections containing none or very few of these skeletal elements (e.g. as for FBT and TVT). Other types of pathologies, like for example healed bones or other clear signs of humans potentially helping to care for an injured dog, have not been found.

With specific focus on pathologies, and through microscopic analysis, there is certainly potential for detecting more potential pathologies in this material.

Number of elements with pathologies							
	Bryggen	Dreggen	FBT	TVT	EBG	Gásir	Oddstaðir
Pathologies	0	1	0	0	0	1	0
Potential pathologies	2	3	0	0	1	0	0

Table 49: *Number of elements with pathologies and possible pathologies per location. (Table by author).*

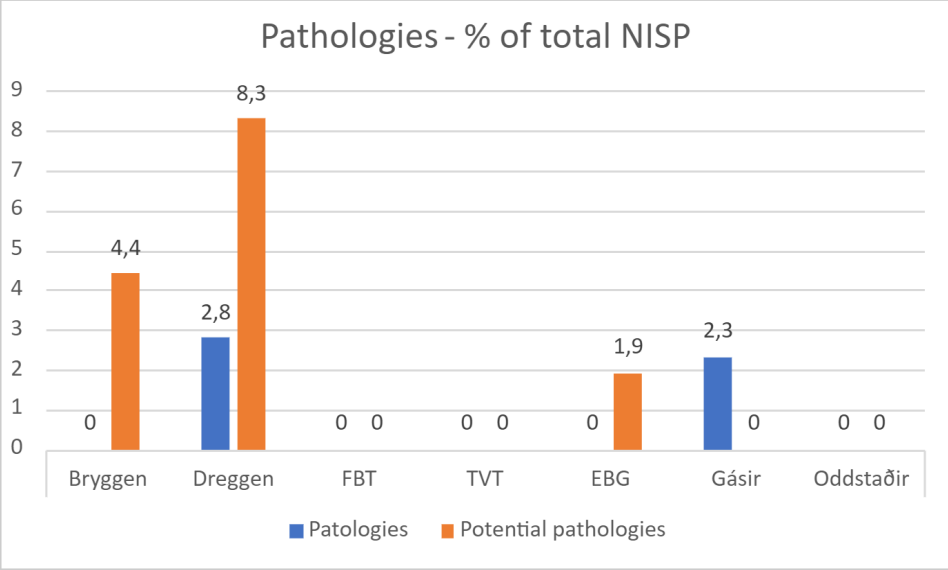


Figure 67: *Pathologies identified in the material of the different locations, as by percentage of the sites' dog NISPs.*

As seen in the foregoing chart (**Figure 67**), Dreggen is the site with the most pathologies (2,8%) as well as potential pathologies (8,3%) identified. The only other site with clear pathologies identified is Gásir (at 2,3%). As for further potential pathologies found, it was seen in 4,4% of the Bryggen material, as well as 1,9% of the EBG material.

5.2.3.5 Markings

As for markings on the bones, both markings inflected by humans (tool marks) and markings inflected by animals (gnaw marks) were registered. Below follows an overview (**Table 50**) of all tool marks found in the material of the locations in question, and the latter figure (**Figure 68**) shows how the locations compare as in how big a percentage of the total NISP had tool marks identified. Following, an equal table (**Table 51**) and chart (**Figure 69**) is presented with the numbers presenting gnaw marks.

Number of elements with tool marks							
	Bryggen	Dreggen	FBT	TVT	EBG	Gásir	Oddstaðir
Tool marks	8	5	0	6	0	0	0

Potential tool marks	12	8	3	10	18	0	0

Table 50: *Number of elements with tool marks detected, as per location. (Table by author).*

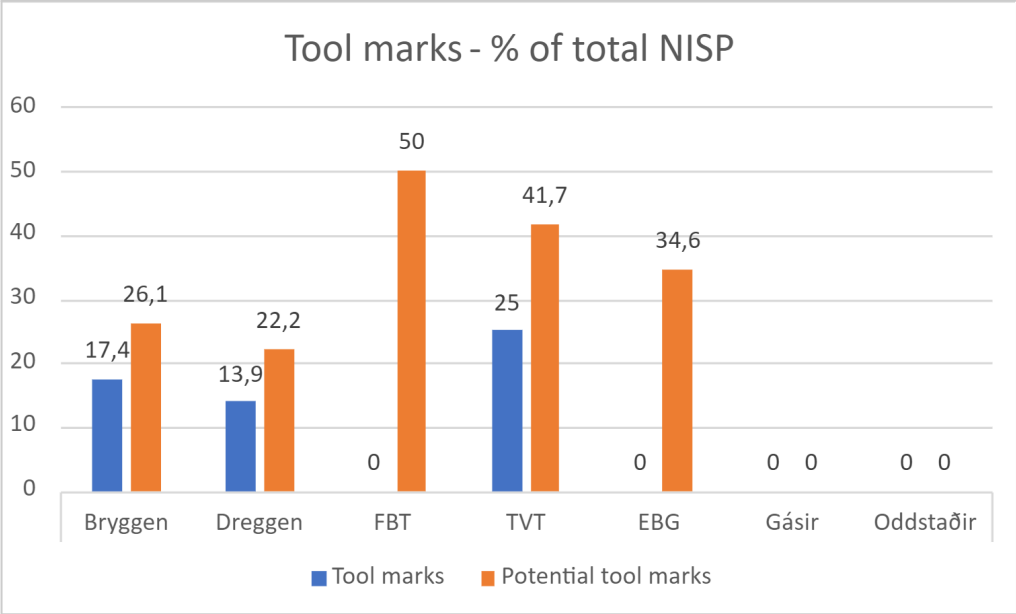


Figure 68: *Percentage of total NISP displaying tool marks (blue) and potential tool marks (orange), as per location.*

As for tool marks identified in the material, the three locations of Bryggen, Dreggen, and TVT are the ones where we find clear evidence of such markings. The location with the highest percentage (of the total NISP) having clear tool marks is TVT at 25%. Bryggen follows not too far behind, at 17,4%, and Dreggen comes in at 13,9%. As for potential tool marks (markings that potentially represent tool marks, but could need a closer look), FBT and EBG join in at the relatively high values of 50% and 34,6%. The three locations containing material with clear tool marks all have potential tool marks as well: Bryggen at 26,1%, Dreggen at 22,2%, and TVT at 41,7%. The two Icelandic locations show no signs of tool marks nor potential tool marks.

Number of elements with gnaw marks							
	Bryggen	Dreggen	FBT	TVT	EBG	Gásir	Oddstaðir

Gnaw marks	0	1	0	0	0	0	0
Potential gnaw marks	5	6	0	0	0	0	0

Table 51: *Number of elements with gnaw marks and potential gnaw marks identified, as per location. (Table by author).*

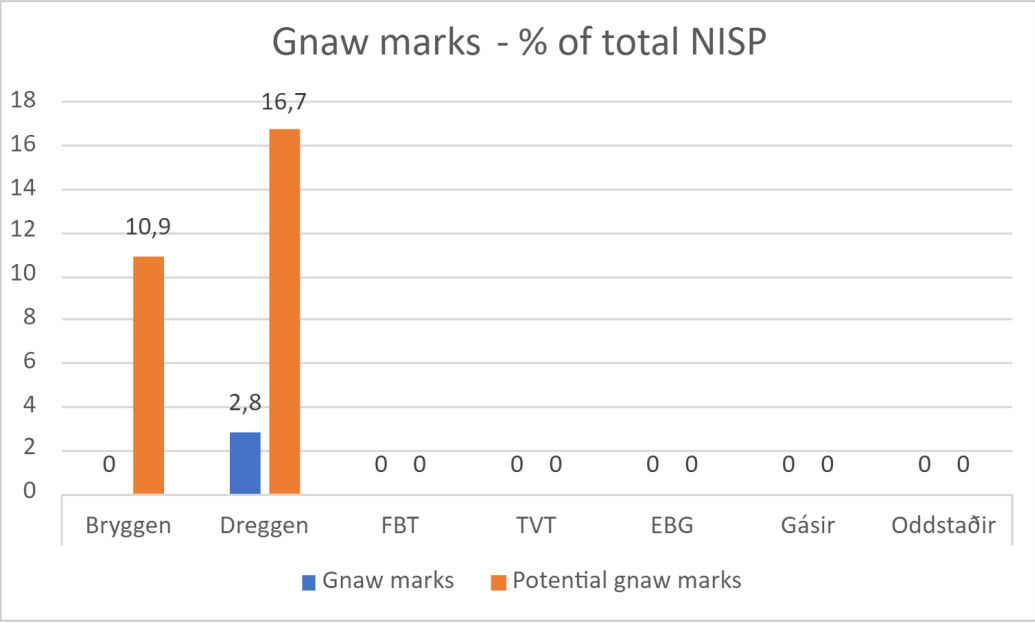


Figure 69: *Percentage of total NISP with gnaw marks (blue) and potential gnaw marks (orange), as per location.*

When it comes to gnaw marks, such markings were only detected in the two locations of Bergen; Dreggen and Bryggen. In the Bryggen material 10,9% of the total dog NISP showed signs of potential gnaw marks, and for Dreggen 16,7% showed such signs, as well as having an additional 2,8% of certain gnaw marks identified. All gnaw marks identified look to stem from rodents. This might indicate that the disposal method used in Bergen differed from the ones used in the other areas and locations, where the likes of rats might have had an easier access to the garbage disposals of Bergen.

6. Discussion

Below follows a discussion of my results, as well as of how these can potentially answer the research questions at hand. I will present the information as by the four main research questions addressed through this study.

6.1 What kind of dogs were present at the chosen locations in the chosen time span? (size, morphology/type, age, health)

In the end, my results regarding dog morphologies got limited to neoteny and shoulder heights. This makes it so that there is not a great deal I can add to the information regarding the types of dogs of the different locations. There are, though, still a couple aspects to discuss on the basis of the studies conducted.

6.1.1 Size and morphology

The fact that there was no neoteny found in the skulls of the chosen locations, potentially witness of a lack of these extremely short snouted types of dogs at the given time and places. Knoest does however report of several of the Bryggen individuals as being brachycephalic, which is an extreme case of neoteny. On the basis of this, as well as Knoest concluding with the diversity in dog types were as extensive in the MA as today, I would assume that dogs with neoteny existed in the MA, but did not end up in the middens of the chosen locations (Bartosiewicz, 2018, pp.21-23; Knoest, 2015, pp.85-86).

Shoulder heights can reveal information on dog sizes and dog types. As for the analysed material we see roughly the same height spans across the locations. The outliers would be the two Icelandic locations, with rather small individuals. Because of the small collections of Icelandic dog remains studied here, it is hard-to-impossible to say anything about trends or patterns. What we can know for certain is that the types of dogs found did exist in the given time and space, and were thus part of the picture that made up the group of dogs present at the time. The Icelandic dogs studied, seemingly one individual from Oddstaðir and up to 19 individuals from Gásir, are interestingly all very small in size. This with the measurable Gásir

dogs coming in at shoulder heights of between 272-312 mm, and the Oddstaðir individual being smaller than the modern red fox.

6.1.2 A lack of large individuals?

None of the individuals for which shoulder height reconstructions were possible could be placed into the large-sized dog category, which includes dogs of a shoulder height above 73 cm. This means no remains of large dog types or breeds, like those of the Mastiff, "butcher dogs", or "war dogs" could be proven to have been included in the material. We do, nevertheless, have very big mandibles and teeth, as well as a partial innominate, from Erkebispegården in Trondheim. These could potentially derive from very large specimens, presumably belonging in the large-sized-dog category, perhaps of the types mentioned above. The EBG individuals are at the size of a modern day wolf, and it would be interesting to see what further studies on these elements could reveal.

6.2 Where do the dogs fit in in the social society at the chosen locations in the chosen time span? (roles, use, care, value, disposal)

It is in discussing this question where the Actor Network Theory (as of Latour, Callon, and Law) comes in. The use and value of the dogs would represent their *role* in the given *networks* (the society of the time and places).

6.2.1 Small individuals - Lap dogs or working dogs?

Both Hufthammer (1994) and Harrison (2009) have already addressed the potential of the small, lap dog sized dogs having been of the types kept as companions by high-status people. Small dogs were not a new phenomenon in the Middle Ages (e.g.: Dannenfeldt, 1982; Knoest, 2015; O'Conor, 1926), and are known to have been used for hunting and pest control (modern day examples would be dachshunds and terriers) (Dannenfeldt, 1982, p.545; O'Conor, 1926, p.13). I believe it more likely that the smaller dogs found were kept for this kind of use, rather than that of companionship for the aristocrats. A reason for this is the disposal type and places of the dead animals. These dogs were all found in middens, alongside waste and scraps of food animals, likely reflecting the use of many of the dogs

analysed here. It would seem more likely, as e.g. Bergland (2014) as well as Hill (2013) mentions; that the dogs kept and cherished by the high-status people would likely have been disposed of elsewhere (being buried, and possibly given their own graves). Another indicator that these dogs were those of low to mid-status people (or even ownerless street dogs), is the fact that these small dogs were found in the middens of places where most people likely were of low to middle class, and were thus more likely to keep smaller dogs as e.g. work source, rather than for company solely.

On the other hand, there are, as Harrison states, indicators of higher standing people having been present at locations in the vicinity of the Icelandic locations, and this would be the case for the Norwegian locations as well (with royal residencies and bishop seats). Thus it is not entirely impossible that lap dogs, kept as status symbols, were present in the area of the locations in the MA.

For the small individuals it seems safe to exclude the war dog role as well. For the dogs of this size we could be dealing with dog types utilised as guard dogs (for alarming), small hunting dogs, or for pest control. Although some smaller individuals do seem to bear tool marks, it seems unlikely that dogs of such a size would be bred for the purpose of being used for their (sparse amount of) meat, and were maybe the likes of working dogs or street dogs who were slaughtered for their pelts or for consumption in times of need.

6.2.2 Tool marks - More than just work force

It is clear, from the amount of tool marks found, that the dogs of the Norwegian locations have been used as food and/or material resources. The dogs could have been used for their meat in times of need, or their pelts taken for people to stay warm. Although no markings were discovered in the six bones of FBT, I still find it likely that the people of this site would treat and use dogs similar to the two other Trondheim locations, and that the reason this is not visible is given the very sparse material available.

As for the case of EBG, where no certain tool marks could be identified, there is a possibility that this could be because of the residents' role in, and tie to the church. As religious legislations of MA Norway said not to eat dogs, people of the church presumably had to lead by example. Another reason for the lack of tool marks could be that the people of EBG, who

were people of the church, and thus people of power and wealth, would still have somewhat of an access to food in times of need, because of their resourcefulness (Bergland, 2014, pp.39-40; Hufthammer, 1999; Skaar, 2014, pp.62-65).

When it comes to the locations of Bergen, it is clear that dogs were consumed. It would be interesting to look at the material of Dreggen and Bryggen (Hanseatic settled area) in comparison to material from elsewhere in MA Bergen. This to see if one could identify differences in how the Hansa kept their dogs, versus how the local Norwegians kept them. The dogs of Bryggen and Dreggen seem to have been used as a food source in parts of the MA. But was this just the Hansa, or did others in Bergen also come to do the same? Eating dogs was illegal by law, but perhaps exceptions were made e.g. in the case of famine.

As for the Icelandic sites, no tool marks were found in the material. Iceland also had legislations making a taboo of dog meat consumption, potentially being the reason we can not see traces of such activity. Oddstaðir also has a sparse dog material to begin with, but such markings would be expected to appear in the bigger Gásir collection, if such activities were carried out. It would be interesting to see how these two locations compare to other MA locations of Northern Iceland in regards to tool marks.

6.3 Can we extract more information from the previously analysed archaeofaunal material based on visual and morphometric (macro-) analysis? (review and additional analysis)

6.3.1 Comparison of Data

Following I will present comparisons of my findings to the previously produced data from the same material and topic. Below I will discuss my findings, as by location. I will not go into the differences in TNF and NISP counts, as I find many of these likely to be of a nature of different ways of counting.

Bryggen

The previously available information on the Bryggen dogs was vast and detailed. The Bryggen dog material is unique in that it having been studied to such an extent and in such detail. As for my findings through my own analyses, of a small part of the Bryggen dog material, I find no reason to challenge Hufthammers statements of the 1994 study. On the basis of there already existing so much information on the Bryggen dogs, there was not much to be added when looking at the bigger picture. The area where I was, nevertheless, able to add to, was when going into details, for example as looking at the case of individuals, and in presenting pictures, illustrations and explanations regarding these.

Dreggen

To the best of my knowledge, the Dreggen dog material was only studied through the initial zoo-osteological rapport of Undheim (1985). As for Undheim's findings, there is one statement I find to not match my own: The fact that the dogs are listed as animals not being consumed. On the basis of finding both several cleat cut marks, as well as a partitioned bone in the collection, my conclusion is that, for at least parts of the MA, the dogs were likely used for their meat.

As for height reconstructions, we both landed at roughly the same heights. In addition to Undheims work, I've gone into detail about cut and butchery marks present, as well as identifying some accounts of pathology and gnaw marks. I've also added to the work on the Dreggen dogs through the likes of figures, illustrations, and information on specific elements and individuals.

Folkebibliotekstomten

The FBT material has been included in several studies since its initial analysis, presented in the osteological report of 1989. As for the data and information produced by Lie (1989), I was able to add in several aspects, even given the sparse material of the location. As Lie only briefly mentioned the overall size of the dogs, my individual height reconstructions, as well as photos, graph, and illustration, are seen as additions to the existing data. As for markings, and whether the dogs of FBT were used as material resources (e.g. for the pelt), Lie does not touch upon this. I found no definite markings in the material, but several potential ones, and have briefly commented on my views on the matter.

As for the discussions on the further information produced by the later studies of Bergland (2014), Skaar (2014), and Knoest (2015), see subchapters below.

Televerkstomten

I was able to add to the existing information on TVT in some aspects. As for the initial work done on TVT, Marthinussen concludes with there not being any long bones applicable to height reconstruction calculations in the TVT material. I, however, was able to carry out such calculations on five of the long bones present. Marthinussen also concluded on the TVT dogs not having been consumed, and there I disagree. This as both cut marks and partitioned bones were found in the material.

Further information on TVT has also been produced through the later studies conducted by Bergland (2014), Skaar (2014), and Knoest (2015); See subchapters below.

Bergland (2014) - FBT & TVT

As for Bergland's work on the FBT and TVT dogs, she added some important discussions on aspects like dogs as "pets", and dogs as a food source. Her findings that the dogs of the two MA locations were likely not what we today regard as pets seem correct. Regarding whether the dogs were eaten or not, Bergland concludes with not being able to see any signs of such activity, but that more thorough studies of the bone material might reveal more information. Based on my analysis, I argue that the positive identification of several cut marks as well as the presence of a small amount of partitioned bones in the TVT material reflect the fact that some of the dogs, at least at TVT, were likely consumed.

Erkebispegården

The EBG dog material was initially analysed as part of Hufthammer's (1999) osteological report. I was able to add to the height reconstruction data available for EBG, which resulted in six elements used for height reconstructions, in comparison to Hufthammer's two. As for most of the data on sizes, and markings, we seem to have come to roughly the same conclusions. Hufthammer's analyses of 1999 seems to have been quite detailed, resulting in a lot of information on the EBG dogs. After doing my own analyses on the material, I have found no information given in the initial osteological report that I see any reason to doubt.*

The EBG dogs have also been included in further work by Skaar (2014), and Knoest (2015), discussed below.

*Note:

As for dating, it could be discussed whether the EBG material should have been included in this study at all, given the statement that there from the east wing area were found almost no traces of activity from before c. 1500 CE. (see subchapter 2.3.3), and both area A and B are located within the east wing. This could make one think that perhaps the EBG dogs are not mediaeval individuals at all, but rather modern ones. Nevertheless, according to Hufthammer's dating of the dog material, they stem from c. 1250 - c. 1780, and 24 of the total 61 elements are from periods within the MA. This is when counting the MA to end at the reformation of 1536, and not at 1500, thus including the material of period 6 of EBG. If we are to count only the dog material of 1030 - 1500 (the MA time span suggested by Darvill, 2008, pp.274-275), we would only be left with one element, from period 4 (c. 1250 - c.1475).

Skaar (2014) - Bryggen, TVT, FBT, and EBG

As for Skaar's study on MA foodways, she brings up several important topics in relation to animal consumption. Skaar mentions how one in both land laws and Christian legislations can find regulations regarding the consumption of dogs, in which both speak against it. She then draws the conclusion that probably, on the basis of evidence found in the archaeological material, dogs were nevertheless at times consumed in MA Norway. Most likely reflecting times of need (e.g.: Skaar, 2014, pp.62-65; Hufthammer, 1994, pp.234-237). As Skaar and I approach the topic from two different, yet highly related, fields of study, the type of data we produce on dogs don't overlap much.

Knoest (2015) - Bryggen, TVT, FBT, and EBG

Knoest's study on MA dog morphology gives great in-detail information on the dogs of MA Norway. In addition to conducting height reconstructions of the material, Knoest did morphometric analyses on aspects like skull shape and body type, and compared all his findings in regards to modern day dogs. As for the work conducted for my thesis, data on aspects like cut marks, partitioning, gnaw marks, and pathology will be adding to Knoest's results.

Gásir

Harrison (2009) reported on a lot of aspects of the dogs found at Gásir, and thus a lot of information already existed on these dogs. As for how our results compare, in the areas we both conducted analyses, we seem to come to roughly the same conclusions. And as for being able to add to her work, I have mainly contributed in the form of information on individuals as well as through pictures and illustrations.

Oddstaðir

Harrison (2012) has included discussions on many aspects of the dog found at Oddstaðir in her zooarchaeology report. Given the thorough work already conducted, as well as the sparse nature of the dog material, I have been able to add to the information through the likes of pictures, and figures, as well as brief discussions on these. As for the areas where we both conducted analyses, we seem to have come to roughly the same conclusions.

6.3.2 Adding to the data

Not all analysis potentials were carried out to its fullest (as this would require more time and resources of a masters degree). Still, I feel I was able to add to several aspects of most of the locations. If not to the information on the dogs directly, then at least through visualising data, and comparing locations. Naturally, there was more for me to add to to the locations where the only previous study of the dog material had been the initial post-excavation osteological analyses (e.g. Dreggen). And less for me to add to the locations where in-depth dog bone analysis had been made (e.g. Bryggen).
All in all I was able to add to the existing information of all locations, and I believe more can still be done with the selected material, even in continuing using only macro analysis.

6.4 How do the locations compare? (in regards to the two first questions)

For the sake of the Icelandic material, it is of yet hard to talk about how the tendencies of the locations compare to each other, and how the Icelandic material compares to the Norwegian. This as there is so little dog material present at the given Icelandic locations. To get a better

understanding of the Icelandic dogs of MA northern Iceland, including work on e.g. the Kolkuós dogs, which Traustadottir mentions (2018, p.128; p.132), could be a great addition.

Based on the available data it would, nevertheless, seem that the Icelandic dogs were mainly of quite small individuals, in contrast to the Norwegian locations, where the dogs seem to span from small to medium size. As for tool marks, no signs of such activity was found at any of the Icelandic locations, in contrast to Norway, where at least three, and potentially all of the locations contained such markings. When it comes to pathologies, such signs of illness were found in both the Norwegian as well as the Icelandic material. This means that, at least to some degree, the dogs of both places suffered some health issues.

When comparing the Norwegian locations to each other, they seem similar in regards to size, tool marks, and pathologies. The two Trondheim locations of FBT and TVT apparently do not contain individuals with visible pathologies, but in my opinion this seems to be most likely based on the lack of skulls in the material, rather than a true difference from the other locations. As for gnaw marks, such markings were only found on the material of the two Bergen locations, potentially witnessing of a somewhat different, more “rat-accessible”, disposal method used there.

7. Conclusions

Based on the results of this study, also seen in the light of previously conducted studies on similar topics, it seems clear that one can reveal a lot of information in regards to dog types by studying their osteological remains. As one of the topics of this study, even in solely conducting macro analyses on these remains we can get a lot of information. Even further macroscopic studies could be carried out on the given material to further our understanding of these dogs of the past, and the ever expanding possibilities in using micro studies, like e.g. aDNA and isotopic studies, could take us even further.

As for how the dogs fit in the societies of the given time and space, their *actor roles* in their respective *networks*, for certain aspects it seems hard to land at anything more than guesswork. It can be hard to judge from the dog remains alone which potential work a dog performed during its lifetime. Still, other source types, like context, contemporary literature and depictions can be of help. Nevertheless, there are certain things we are able to tell from looking at the zooarchaeological remains alone. Aspects like the presence of tool marks, marks in the form of cuts and from partitioning, work as certain indicators of the dogs having been used as material resources and/or for consumption.

In the comparison of the locations, there seems to be a potential pattern of mainly smaller dogs being kept in the given region of Northern Iceland. It is hard to say for certain without examining more Icelandic material, adding e.g. information on the Kolkuós individuals. So far, there were no signs of the Icelandic dogs having been consumed or killed for their pelts, while for most of the Norwegian locations such indicators do exist.

As for my contribution to the existing material, I was, for most of the locations, able to add through visualisations of the data, through the likes of pictures and illustrations, tables, and graphs. As for adding to data and numbers, it varied how much I was able to add, based on how much had been done with the material in the past. One thing is adding to the information on the dogs, but as this is a zooarchaeological study, the ultimate goal is to uncover something about the human past, through the study of animal remains. On this aspect, my

greatest contribution seems to be on the analysis and discussion on whether or not the dogs were killed for meat consumption and/or their pelt. In being able to take my time with most of the macro analyses conducted, I was able to discover tool marks in material collections previously assumed to not have such markings (Undheim, 1985, and Marthinussen, 1992). The assumption that dogs were not consumed seems to have been made, perhaps on the basis of it clearly being stated as taboo in contemporary literary sources.

As for morphology I had been hoping for results on a wider range of aspects, making me able to address the types of dogs present (further than size, and potentially revealing what tasks they were kept for). I found myself able to get a small step closer to being able to discuss the matter, but there is a definite need for further studies before one can reach any conclusions on the matter.

Literature

Albarella, U. (2017) Zooarchaeology in the Twenty-First Century - Where we come from, where we are now, and where we are going. In: *The Oxford Handbook of Zooarchaeology*, Albarella, U. (ed.), pp.3-21. Oxford: Oxford University Press. (19p)

Alonso, R., et al. (2007) Histopathologic study of long-bone growth plates confirms the Basset Hound as an osteochondrodysplastic breed. In: *Canadian journal of veterinary research = Revue canadienne de recherche vétérinaire,* 71, pp.66-69. Available at: https://www.researchgate.net/publication/6606102_Histopathologic_study_of_long-bone_growth_plates_confirms_the_Basset_Hound_as_an_osteochondrodysplastic_breed (Accessed: 16.08.2022). (4p)

Bartosiewicz, L. (2018) "Forever young": neoteny and design. In: *Annalen des Naturhistorischen Museums in Wien*, Serie A, 120, pp.19-30. Available at: http://verlag.nhm-wien.ac.at/pdfs/120A_019030_Bartosiewicz.pdf (Accessed: 29.01.2023). (12p)

Benedictow, O.J. (2016) The Black Death in Norway, 1348-1349. In: *The Black Death and Later Plague Epidemics in the Scandinavian Countries - Perspectives and Controversies*, pp.100-182. De Gruyter Open: Poland. Available at: https://www.academia.edu/42820004/2_The_Black_Death_in_Norway_1348_1349 (Accessed: 04.10.2022). (83p)

Bergland, T. (2014) *Dyr i Trondheims middelalder - Arkeologiske perspektiver på et osteologisk materiale.* Master's thesis in archaeology. Trondheim: NTNU. (108p)

Bjørlo, A.H. (2010) *Fra landnåmet til fristatens slutt - Migrasjon, tradisjon og strategier i Eyjafjörður*. Master thesis in Archaeology. Oslo: University of Oslo. Available at: https://www.duo.uio.no/bitstream/handle/10852/23045/MasteroppgavexixArkeologixAstridxH.xBjxrloxVxrx2010.pdf (Accessed: 30.10.2022). (104p)

Blackmore, L. & Vince, A. (1994) Medieval pottery from south east England found in the Bryggen excavations 1955-68. In: *The Bryggen Papers - Supplementary Series No. 5*, pp.9-41. Bergen, University of Bergen: Scandinavian University Press. (33p)

Bandlien, B. & Norseng, P.G. (n.d.) Olav Tryggvason. In: *Store norske leksikon* at snl.no. Available at: https://snl.no/Olav_Tryggvason (Accessed: 26.10.2022). (n.p.)

Broughton, J.M. (2015) Zooarchaeology. In: *International Encyclopedia of the Social & Behavioral Sciences*, Wright, J.D. (ed.), 2nd ed., vol. 25, pp.849-853. The Netherlands: Elsevier. Available at: https://www.sciencedirect.com/science/article/pii/B9780080970868130533 (Accessed: 21.09.2021). (5p)

Buzek, A., et al. (2022) The Shape of the Nasal Cavity and Adaptations to Sniffing in the Dog (*Canis familiaris*) Compared to Other Domesticated Mammals - A Review Article. In: *Animals*, 2022; 12 (4), 517, pp.1-18. Available at: https://www.mdpi.com/2076-2615/12/4/517/htm (Accessed: 16.08.2022). (18p)

Carter, T. (2015) *Iceland's Networked Society - Revealing How the Global Affairs of the Viking Age Created New Forms of Social Complexity*. Leiden: Brill. Available at: https://brill.com/display/title/27203 (Accessed: 30.10.2022). (368p)

Christophersen, A. (1985) *Prosjektprogram - Fortiden i Trondheim bygrunn: Folkebibliotekstomten. Meddelelser nr. 1.* Trondheim: Riksantikvaren. Available at: https://www.ntnu.no/documents/10476/1280789430/Medd_1_WEB.pdf/7842ab21-0619-4a0f-8d2d-5245c516026c (Accessed: 20.02.2022). (64p)

Christophersen, A. (ed.)(1992) *I kongers kaupang og bispers by - Arkeologi forteller byhistorie.* Trondheim: Strindheim trykkeris forlag. Available at: http://urn.nb.no/URN:NBN:no-nb_digibok_2012042008020 (Accessed: 29.03.2022). (177p)

Christophersen, A. & Nordeide, S.W. (1994) *Kaupangen ved Nidelva - 1000 års byhistorie belyst gjennom de arkeologiske undersøkelsene på Folkebiblioteksstomten i Trondheim 1973-1985*, (D.1). Oslo: Riksantikvaren. Available at: https://urn.nb.no/URN:NBN:no-nb_digibok_2008021200019 (Accessed: 29.03.2022). (324p)

Christophersen, A. & Dybdahl, A. (eds.)(1999) *Gásir - En internasjonal handelsplass i Nord-Atlanteren*. Trondheim: Tapir forlag. Available at: https://urn.nb.no/URN:NBN:no-nb_digibok_2010071508199 (Accessed: 30.10.2022). (102p)

Dannenfeldt, K.H. (1982) The Control of Vertebrate Pests in Renaissance Agriculture. In: *Agricultural History,* Vol. 56 (3), pp.542-559. Available at: https://www.jstor.org/stable/3742553?read-now=1&refreqid=excelsior%3Abfb8294ce09a5993562551602925d7a0&seq=4#page_scan_tab_contents (Accessed: 17.10.2022). (18p)

Darvill, T. (2008) *Oxford - Concise Dictionary of Archaeology*, (2nd ed.). Oxford: Oxford University Press. (547p)

Dover, M.J., MacHugh, D.E., & McHugo, G.P. (2019) Unlocking the origins and biology of domestic animals using ancient DNA and paleogenomics. In: *BMC Biology, 17 (98)*, pp.1-20. Available at: https://bmcbiol.biomedcentral.com/articles/10.1186/s12915-019-0724-7 (Accessed: 17.08.2022). (20p)

Duffy, D.L. & Serpell, J.A. (2014) Dog Breeds and Their Behavior. In: *Domestic Dog Cognition and Behavior*, Horowitz, A. (ed.), pp.31–57. Heidelberg: Springer Berlin. Available at: https://www.academia.edu/81824650/Dog_Breeds_and_Their_Behavior (Accessed: 05.10.2022). (27p)

Ekroll, Ø. (2006) Arkeologi og myter - Om Nidarosdomens historie før 1200. In: *Hikuin, 33: Kirkearkæologi i Norden*, pp.77-98. Denmark, Højbjerg: Hikuin. Available at: https://tidsskrift.dk/Hikuin/article/view/110481/159748 (Accessed: 17.10.2022). (22p)

Friedman, J.B. (2016) Coats, Collars, and Capes - Royal Fashions for Animals in the Early Modern Period. In: *Medieval Clothing and Textiles 12*, pp.61–94. England: Boydell & Brewer. Available at: https://doi.org/10.1017/9781782047698.005 (Accessed: 06.10.2022). (33p)

Giverholt, H., Julsrud, O., Norseng, P.G., Mardal, M.A., Weidling, T.R. (n.d.) Islands historie. In: *Store norske leksikon* at snl.no. Available at: https://snl.no/Islands_historie (Accessed: 30.10.2022). (n.p.)

Gutierrez, K.A. (2017) *Animals in the Viking World - Dogs in Society and Burial.* Masters thesis in Celtic and Viking Archaeology. Glasgow: University of Glasgow. (43p)

Hansen, G. (2006) Kvinner, barn og pølsepinner - Demografiske drypp fra det eldste Bergen. In: *UBAS Nordisk, 3: Samfunn, symboler og identitet – Festskrift til Gro Mandt på 70-årsdagen*, pp.305-319. Available at: https://www.archaeology-gender-europe.org/docs/Hansen_2006-KvinnerBarn.pdf (Accessed: 15.04.2021). (15p)

Harcourt, R.A. (1974) The dog in prehistoric and early historic britain. In: *Journal of Archaeological Science*, Vol. 1, pp.151-175. Available at: https://www.sciencedirect.com/science/article/pii/0305440374900405 (Accessed: 21.09.2021). (25p)

Harrison, R., Adderley, W.P., & Roberts, H. (2008) Gásir in Eyjafjörður - International Exchange and Local Economy in Medieval Iceland. In: *Journal of the North Atlantic [JONA]*, 1 (1), pp.99-119. Available at: https://www.researchgate.net/publication/229020220_Gasir_in_Eyjafjordur_International_Exchange_and_Local_Economy_in_Medieval_Iceland (Accessed: 16.09.2022). (20p)

Harrison, R. (2009) The Gásir Area A Archaeofauna: An Update of the Results from the Faunal Analysis of the High Medieval Trading Site in Eyjafjörður, N Iceland. In: *NORSEC*

Zooarchaeology Laboratory REPORT No. 44. Available at: https://www.academia.edu/22068767/The_G%C3%A1sir_Area_A_Archaeofauna_An_Update_of_the_Results_from_the_Faunal_Analysis_of_the_High_Medieval_Trading_Site_in_Eyjafj%C3%B6r%C3%B0ur_N_Iceland (Accessed: 17.10.2022). (34p)

Harrison, R. (ed.)(2010) *Gásir Hinterlands Project 2009 Midden Prospection and Excavation*. FSÍ, Reykjavík and CUNY NORSEC, New York, FS440-06384. Available at: https://www.nabohome.org/uploads/ramonah/FS440-06384_Gasir_Hinterlands_2009.pdf (Accessed: 18.10.2022). (66p)

Harrison, R. (2012) Oddstaðir in Hörgárdalur, N. Iceland - Report of the 2009 Archaeofauna. In: *HERC/NORSEC Zooarchaeology Laboratory REPORT No. 58*. Available at: https://www.nabohome.org/uploads/ramonah/RH_Oddstadir_NORSEC_Report_NR_58.pdf (Accessed: 17.10.2022). (64p)

Helle, K. (2019) Bergen's role in the medieval North Atlantic trade. In: *AmS-Skrifter 27*, pp.43–51, Stavanger. Available at: https://journals.uis.no/index.php/AmS-Skrifter/article/view/254 (Accessed: 17.10.2022) (8p)

Herteig, A.E. (1969) *Kongers havn og handels sete - Fra de arkeologiske undersøkelser på Bryggen i Bergen 1955-68*. Oslo: Aschehoug. Available at: https://urn.nb.no/URN:NBN:no-nb_digibok_2007073001023 (Accessed: 18.05.2022). (223p)

Hill, E. (2013) Archaeology and Animal Persons - Toward a Prehistory of Human-Animal Relations. In: *Environment and Society, Vol. 4 (2013)*, pp.117-136. Available at: https://www.jstor.org/stable/43297040 (Accessed: 26.10.2022). (20p)

Hillson, S. (2009) *Mammal Bones and Teeth - An Introductory Guide to Methods of Identification*. University of London, Institute of Archaeology: Routledge. (132p)

Hufthammer, A.K. (1994) The dog bones from Bryggen. In: *The Bryggen Papers -*

Supplementary Series No 5, pp.209-285. Bergen, University of Bergen: Scandinavian University Press. (77p)

Hufthammer, A.K. (1999) Kosthold og erverv i Erkebispegården - En osteologisk analyse. Utgravningene i Erkebispegården i Trondheim. In: *NIKU Temahefte, Vol. 17*, pp.2-47. Trondheim: NIKU. Available at: https://urn.nb.no/URN:NBN:no-nb_digibok_2008102300007 (Accessed: 29.03.2022). (46p)

Johnson, M. (2010) *Archaeological Theory - An Introduction*, 2nd ed. UK: Wiley-Blackwell. (264p)

Jondell, E., Reed, I.W. and Marstein, O. (n.d. / 1992) *Televerkstomten – Et sentralt utkantområde i middelalderbyen. Rapport fra de arkeologiske undersøkelsene i 1977, Nordre gate 1, Trondheim.* Unpublished report. Trondheim: Riksantikvaren, Utgravningskontoret for Trondheim. (111p)

Kaupang (n.d.) In: Store norske leksikon. Available at: https://snl.no/kaupang (Accessed: 28.01.2023). (n.p.)

Knoest, J.J.T. (2015) *On the morphology of the domesticated dog in medieval Norway - An Osteometric study.* Master thesis. Bergen: University of Bergen. (233p)

Lie, R.W. (1989) Dyr i byen - En osteologisk analyse. In: *Fortiden i Trondheim bygrunn - Folkebibliotekstomten, Meddelelser Nr.18*. Trondheim: Riksantikvaren, Utgravningskontoret for Trondheim. Available at: https://ra.brage.unit.no/ra-xmlui/bitstream/handle/11250/2580950/Folkebibliotekstomten_18.pdf?sequence=1&isAllowed=y (Accessed: 27.03.2022). (61p)

Long, C.D. & Marstrander, L. (1980) *Dreggsalmenningen i Bergen - Rapport fra de arkeologiske undersøkelser, 1979.* Oslo. Available at:

https://bildearkiv.ra.no/fotoweb/albums/Y3tL68AATnVA7oQz/637b4bdfb4cef66dc67d74c4#c=%2Ffotoweb%2Falbums%2FY3tL68AATnVA7oQz%2F (Accessed: 22.01.2023). (170p)

Lucas, G. (2012) *Understanding the Archaeological Record*. Cambridge: Cambridge University Press. (306p)

Løberg, G. (2017) Skjødehund. In: *Store norske leksikon* at snl.no. Available at: https://snl.no/skj%C3%B8dehund (Accessed: 06.09.2023). (n.p.)

Magerøy, H. (n.d.) Njåls saga. In: *Store norske leksikon* at snl.no. Available at: https://snl.no/Nj%C3%A5ls_saga (Accessed: 26.10.2022). (n.p.)

Makowiecki, D. (2006) Remarks on the "Breeds" of Dogs (*Canis lupus F. Familiaris*) in the Polish Lowland in the Roman Period, the Middle Ages and Post-Medieval Times in the Light of Archaeozoological Research. In: *Fasciculus XVIII, Archélogie et Nature - céréales - arbres - animaux*, pp.63-70. Łódź, Poland: Instytut Archeologii i Etnologii PAN, Warszawa and Polska Akademia Nauk, Oddział w. Łodzi. (7p)

Marthinussen, K.L. (1992) *Et osteologisk materiale fra Televerkstomten - Undersøkelse av et utgravd beinmateriale fra middelalderens Trondheim (Nordre gt.1).* Major in systematic zoology. Bergen: Zoologisk museum, Universitetet i Bergen. (93p)

Molaug, P.B. (2008) Oslo blir by – fra 1000 til 1200. In: *UBAS Nordisk 5: De første 200 årene - nytt blikk på 27 skandinaviske middelalderb*yer, Andersson, H., Hansen, G. og Øye, I. (ed.), pp.73-92. Bergen: Universitetet i Bergen. Available at: https://bora.uib.no/bora-xmlui/bitstream/handle/1956/11369/oslo-blir-by-fra-1000-til-1200.pdf?sequence=1&isAllowed=y (Accessed: 01.04.2022). (20p)

Nordbø, B. (n.d.) Heimskringla. In: *Store norske leksikon* at snl.no. Available at: https://snl.no/Heimskringla (Accessed: 26.10.2022). (n.p.)

Nordeide, S.W. (ed.)(2000) Utgravningene i Erkebispegården i Trondheim. In: *NIKU Temahefte 12, pp.3-222*. Trondheim: NIKU. Available at: https://urn.nb.no/URN:NBN:no-nb_digibok_2008102300005 (Accessed: 29.03.2022). (216p)

Norsk Institutt for Kulturminneforskning [NIKU] (2017) "I middelalderbyens grenseland", *NIKUs arkeologiblogg (blog)*. Available at: https://arkeologibloggen.niku.no/i-middelalderbyens-grenseland/ (Accessed: 01.04.2022). (n.p.)

Norsk Kennel Klub [NKK] (1997) *Norsk Buhund - Rasebeskrivelse*. Available at: https://www.nkk.no/getfile.php/131781-1572353516/Filer/Rasestandarder%20-%20nedlastingssenter/Gruppe%2005/Norsk%20buhund%20FCI%20237%20-%20UNDER%20REVIDERING.pdf (Accessed: 01.02.2021). (4p)

North Atlantic Biocultural Organization [NABONE] (2008) *NABONE Zooarchaeological Database - Recording System Codes, 9th ed.* New York: City University of New York. Available at: https://www.nabohome.org/products/manuals/fishbone/NABONE9thEditionFeb10.pdf (Accessed: 24.10.2022). (11p)

O'Conor, P. (2001) *Sporting Terriers - Their History, Training and Management*, 2nd ed. Machynlleth: Coch-y-Bonddu Books. (157p)

O'Connor, T. (2000) *The Archaeology of Animal Bones*. USA, Texas: Texas A&M University Press College Station. (176p)

Olsen, B. (2010) *In Defense of Things: Archaeology and the Ontology of Objects.* Lanham: AltaMira Press. Available at: https://ebookcentral.proquest.com/lib/bergen-ebooks/reader.action?docID=616256&ppg=23 (Accessed: 27.10.2022). (169p)

Ordbøkene (n.d.) Mjå. In: *Bokmålsordboka.* Språkrådet and The University of Bergen. Available at: https://ordbokene.no/bm/38784/mj%C3%A5 (Accessed: 06.09.2022). (n.p.)

Peregrine, P. & Smith, M.E. (2012) Approaches to Comparative Analysis in Archaeology. In: *Comparative Archaeology of Complex Societies*, Smith, M.E. (ed.), ch. 2, pp.4-20. Cambridge: Cambridge university press. Available at: https://www.researchgate.net/publication/286044958_Approaches_to_Comparative_Analysis_in_Archaeology (Accessed: 03.11.2022). (17p)

Perri, A. (2016) A Typology of Dog Deposition in Archaeological Contexts. In: *Economic Zooarchaeology - Studies in Hunting, Herding and Early Agriculture*. (2017) Rowley-Conwy, P., Halstead, P. & Serjeantson, D. (eds.), pp.89-99. Oxford: Oxbow Books. (10p)

Preucel, R.W. (n.d.) *Archaeology and the Limitations of Actor Network Theory.* Unpublished. Available at: https://www.academia.edu/10272554/Archaeology_and_the_Limitations_of_Actor_Network_Theory (Accessed: 20.09.2022). (24p)

Rasmussen, T. (n.d.) *Reformasjonen.* In: *Store norske leksikon* at snl.no. Available at: https://snl.no/reformasjonen (Accessed: 30.10.2022). (n.p.)

Rawcliffe, C. (2018). Town Tykes and Butchers' Hounds - Urban Dogs at Work in the later Middle Ages. In: *Medieval Prosopography*, *33*, pp.45–62. Available at: https://www.jstor.org/stable/26630015 (Accessed: 01.02.2021). (18p)

Reitz, E.J., Newsom, L.A., & Scudder, S.J. (1996) Issues in Environmental Archaeology. In: *Case Studies in Environmental Archaeology*. Reitz, E.J., Newsom, L.A. & Scudder, S.J. (eds.), pp.3-16. New York: Plenum Press. (14p)

Reitz, E.J. & Wing, E.S. (2008) *Zooarchaeology.* 2nd ed. Cambridge, Manuals in Archaeology. UK, Cambridge: Cambridge University Press. (407p)

Roberts, H.M. (ed.)(2006) *Excavations at Gásir 2001-2006 - A Preliminary Report.* FS335-01079, Fornleifastofnun Íslands. Available at: https://www.nabohome.org/uploads/fsi/FS335-01079_GAS06_prelim.pdf (Accessed: 18.10.2022). (27p)

Rosvold, K.A. (2022) Trondheim. In: *Store norske leksikon,* at snl.no. Available at: https://snl.no/Trondheim (Accessed: 25.09.2022). (n.p.)

Schlehr, M.R. & Zink, C. (2020) Working Dog Structure - Evaluation and Relationship to Function. In: *Frontiers in Veterinary Science*, October 2020, vol. 7, pp.1-12. Available at: https://www.frontiersin.org/articles/10.3389/fvets.2020.559055/full (Accessed: 25.03.2022). (11p)

Semb-Johansson, A. (2009) August Brinkmann. In: *Norsk biografisk leksikon* at snl.no. Available at: https://nbl.snl.no/August_Brinkmann (Accessed: 25.03.2022). (n.p.)

Sigurðsson, J.V. (1999) Norsk Historie: 800 - 1300. In: *Samlagets Norsk Historie: 800 - 2000*, vol. 1. Oslo: Det Norske Samlaget. (334p)

Sigurdsson, J.V. (2014) Distribution of reliquaries and relics in the bishopric of Hólar, c.1320. In: *Paint and Piety: Collected Essays on Medieval Painting and Polychrome Sculpture*, Streeton, N.L.W. and Kollandsrud, K. (eds.), pp.67-74. London: Archetype Book. Available at: https://www.academia.edu/9987790/Distribution_of_reliquaries_and_relics_in_the_bishopric_of_H%C3%B3lar_c.1320 (Accessed: 30.10.2022). (7p)

Simonsson, M. (2006) Dogs in the ditch - An archaeologist considers dog remains from an Irish early medieval enclosure. In: *Benbiten*, 2, 2006, pp.8-16. Stockholm: Osteologiska föreningen. (8p)

Skaar, A.R. (2014) *Matkultur i norsk middelalder - Drep meg konge, men ikke med graut!* Master's thesis in history. Oslo: University of Oslo. Available at: https://www.duo.uio.no/handle/10852/42476 (Accessed: 17.10.2022) (74p)

Solberg, B. (2003) *Jernalderen i Norge - 500 før Kristus til 1030 etter Kristus.* Oslo: Cappelen Akademisk Forlag. (371p)

Solberg, B. (2009) Haakon Shetelig. In: *Norsk biografisk leksikon,* at snl.no. Available at: https://nbl.snl.no/Haakon_Shetelig (Accessed: 25.03.2022). (n.p.)

Stefánsson, M. (1986) Bergen - Islands første hovedstad. In: *Kjøpstad og rikssentrum*, Onsdagskvelder i Bryggens Museum II, Øye, I. (ed.), pp.70-87. Bergen: Bryggen Museum. (17p)

Storm, G. (1888) *Islandske Annaler indtil 1578*. Christiania (Oslo): Grøndahl & søns. Available at: https://urn.nb.no/URN:NBN:no-nb_digibok_2006112201014 (Accessed: 26.10.2022). (667p)

Trangerud, C. et al. (2007) A longitudinal study on growth and growth variables in dogs of 4 large breeds raised in domestic environments. In: *Journal of animal science*, 85, pp.76-83. Available at: https://www.researchgate.net/publication/6619799_A_longitudinal_study_on_growth_and_growth_variables_in_dogs_of_4_large_breeds_raised_in_domestic_environments (Accessed: 29.01.2023). (8p)

Traustadóttir, R. (2018) Kolkuós in the North of Iceland - A Harbour Site and Trading Place in the Viking Age to the Medieval Period. In: *Gruel, Bread, Ale and Fish - Changes in the Material Culture Related to Food Production in the North Atlantic 800-1300 AD.*, Publications from the National Museum, Studies in archaeology & history, vol. 26, Mahler, D.L. (ed.), pp.119-138. Denmark: The National Museum of Denmark; University Press of Southern Denmark. (19p)

Trondheim Kommune, Byplankontoret (2016) *Kulturmiljøet Kjøpmannsgata - En kulturhistorisk stedsanalyse av bryggerekken og tilhørende områder.* DIVE analysis. Trondheim: Trondheim kommune. Available at: https://sites.google.com/trondheim.kommune.no/kjopmannsgata/dive-analyse (Accessed: 21.09.2022). (103p)

Tønnesen, J.-M.H. (2020) *Makt i Kalmarunionen tidlige fase - Maktfordeling mellom Nordens kongemakt og aristokrati i perioden ca. 1397-1438*. Master thesis of history. Oslo: University of Oslo, Institute of archaeology, conservation, and history. Available at: https://www.duo.uio.no/bitstream/handle/10852/79153/Makt-i-Kalmarunionen-tidlige-fase---Maktfordeling-mellom-Nordens-kongemakt-og-aristokrati-i-perioden-ca--1397-1438.pdf?sequence=1&isAllowed=y (Accessed: 31.10.2022). (81p)

Undheim, P. (1985) *Osteologisk materiale fra Dreggen - En økologisk studie fra middelalderens Bergen*. Major in zoological ecology. Bergen: University of Bergen. (88p)

Universitetet i Bergen [UiB] (2014) *Osteologisk samling*, at uib.no. Available at: https://www.uib.no/naturhistorie/63998/osteologisk-samling (Accessed: 25.03.2022). (n.p.)

Von den Driesch, A. (1976) A guide to the measurement of animal bones from archaeological sites. In: *Peabody museum of archaeology and ethnology - Peabody museum bulletin, Bulletin 1*. Harvard: Harvard University Press. Available at: https://books.google.no/books?id=UogknwEACAAJ&printsec=frontcover&hl=no&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false (Accessed: 01.03.2020). (137p)

Wallis, L.J. (2019) Canine Life History. In: *Encyclopedia of Animal Cognition and Behavior.* New York: Springer. Available at: https://www.researchgate.net/publication/331989211_Canine_Life_History (Accessed: 05.08.2022). (15p)

Wiig, Ø. (1981) Faunal remains from medieval Bergen. In: *Fauna Norvegica 5*, pp.34-40. (6p)

Wright, J.D. (ed.)(2015) *International Encyclopedia of the Social & Behavioral Sciences* (Second ed.). Amsterdam: Elsevier. Available at: https://www.sciencedirect.com/referencework/9780080970875/international-encyclopedia-of-the-social-and-behavioral-sciences (Accessed: 28.10.2022). (n.p.)

Zoëga, B. (2021) *The disappearing past - Coastal archaeology, shoreline erosion and contributing factors along the coast of Skagafjörður, Northern Iceland.* Master thesis in geography. Bergen: University of Bergen. Available at: https://bora.uib.no/bora-xmlui/bitstream/handle/11250/2759132/bryndis_zoega_mastersthesis_2021.pdf?sequence=1&isAllowed=y (Accessed: 13.05.2022). (64p)

Øye, I. (2014) Bergen and the German Hansa in an Archaeological Perspective. In: *Lübeck und der Hanseraum - Beiträge zu Archäologie und Kulturgeschichte. Festschrift für Manfred Gläser*, pp.481-490. Lübeck: Verlag Schmidt-Römhild. Available at: https://www.academia.edu/11348714/Bergen_and_the_German_Hansa_in_an_archaeological_perspective (Accessed: 15.12.2022). (10p)

Appendix

Page	Appendix	Description
p. 173	Appx. 1	NABONE recording system codes for mammal skeletal elements. ***Source:*** *North Atlantic Biocultural Organization [NABO] - Zooarchaeology Working Group (2008) NABONE Zooarchaeological Database (9th ed.), pp.5-6.*
p. 174	Appx. 2	Map showing the excavation area of Bryggen, marked in orange. Part of the street of the Dreggen excavation can be seen to its immediate left. ***Source:*** *Blackmore & Vince (1994), p.18. Edited by author.*
p. 175	Appx. 3	Map showing the excavated site of Dreggen. ***Source:*** *Long & Marstrander (1980) p.4. Edited by author.*
p. 176	Appx. 4	Map showing the excavated site of Folkebibliotekstomten, with the selected area for osteological research outlined and coloured light orange. Areas with finds of Canis fam. coloured dark orange. ***Source:*** *Lie (1989), p.9. Edited by author.*
p. 177	Appx. 5	Map showing the plan for the excavation of the site of Televerkstomten. ***Source:*** *Riksantikvaren, at https://bildearkiv.ra.no/fotoweb/albums/Y0USIzRgoNZXYHNH/ (Accessed: 13.10.2022).*
p. 178	Appx. 6	Two maps showing the excavated site of Erkebispegården. The first showing where the *Canis fam.* material was found, as well

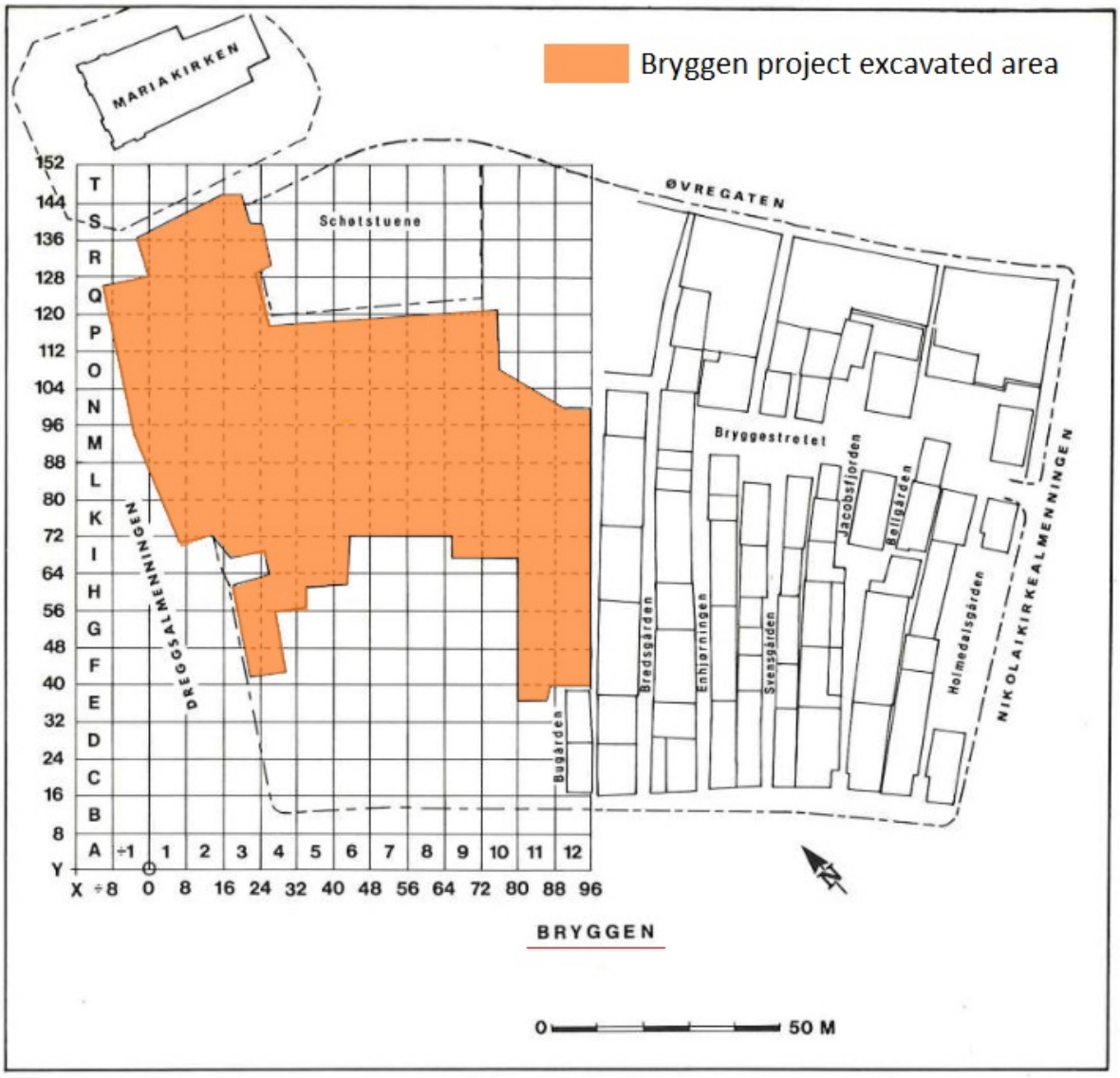
Appendix 1

MAMMAL & BIRD

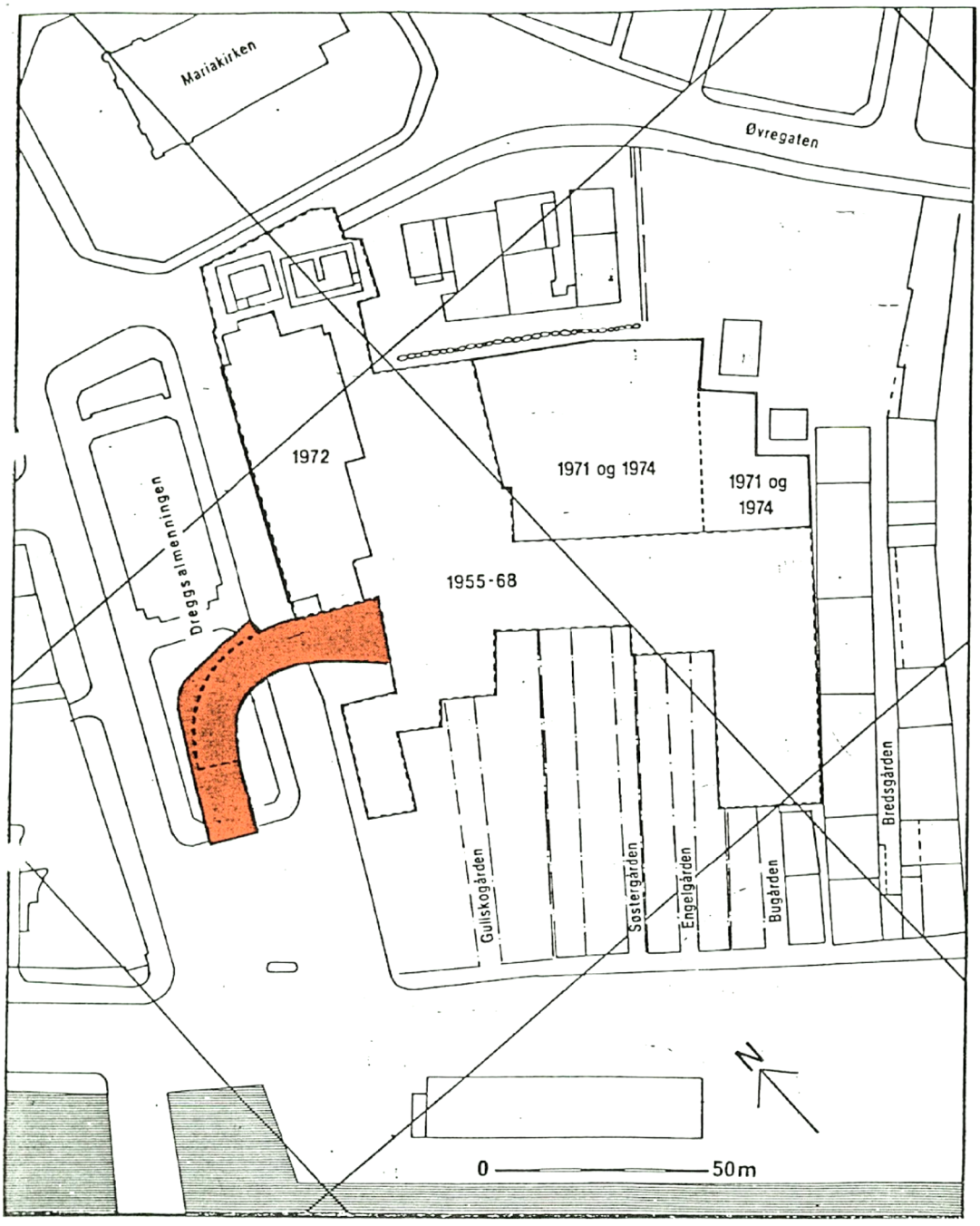
HCO	Horn core fragment
ANT	Antler fragment
ANTS	Antler, shed pedicle
S+*A*	Skull & attached antler
S+H	Skull & attached horn core
SKL	Skull fragment
FRN	Frontal
PAR	Parietal
TEM	Temporal
PET	Petrous (bulla)
ZYG	Zygomatic
OCC	Occipital
NAS	Nasal
ROS	Rostrum
PMX	Premaxilla
MAX	Maxilla
MAN	Mandible
IN	Incisor
PM	Premolar
MO	Molar
CN	Canine
PC	Post canine (seals)
TTH	Tooth fragment
HYD	Hyoid
ATL	Atlas
AXI	Axis
CEV	Cervical vertebra
TRV	Thoracic vertebra
LMV	Lumbar vertebra
CDV	Caudal vertebra
VER	Vertebral fragment
SAC	Sacrum
PAT	Patella
PES	Articulated foot

STE	Sternum
RIB	Rib
CC	Costal cartilage
SCP	Scapula
HUM	Humerus
RAD	Radius
RUL	Radius & ulna
ULN	Ulna
CAR	Carpal
TAR	Tarsal
AST	Astragalus
CAL	Calcaneus
TRC	Naviculocuboid
CTA	Carpal/tarsal fragment
MTC	Metacarpal
MC1	Metacarpal 1
MC2	Metacarpal 2
MC3	Metacarpal 3
MC4	Metacarpal 4
MC5	Metacarpal 5
PHA	Phalanx fragment
PH1	Phalanx 1
PH2	Phalanx 2
PH3	Phalanx 3
SES	Sesamoid
FEM	Femur
TIB	Tibia
TIF	Tibia & fibula (seals)
LML	Lateral malleolus
FIB	Fibula
MTT	Metatarsal
MT1	Metatarsal 1
MT2	Metatarsal 2
MT3	Metatarsal 3
MT4	Metatarsal 4

Appendix 2

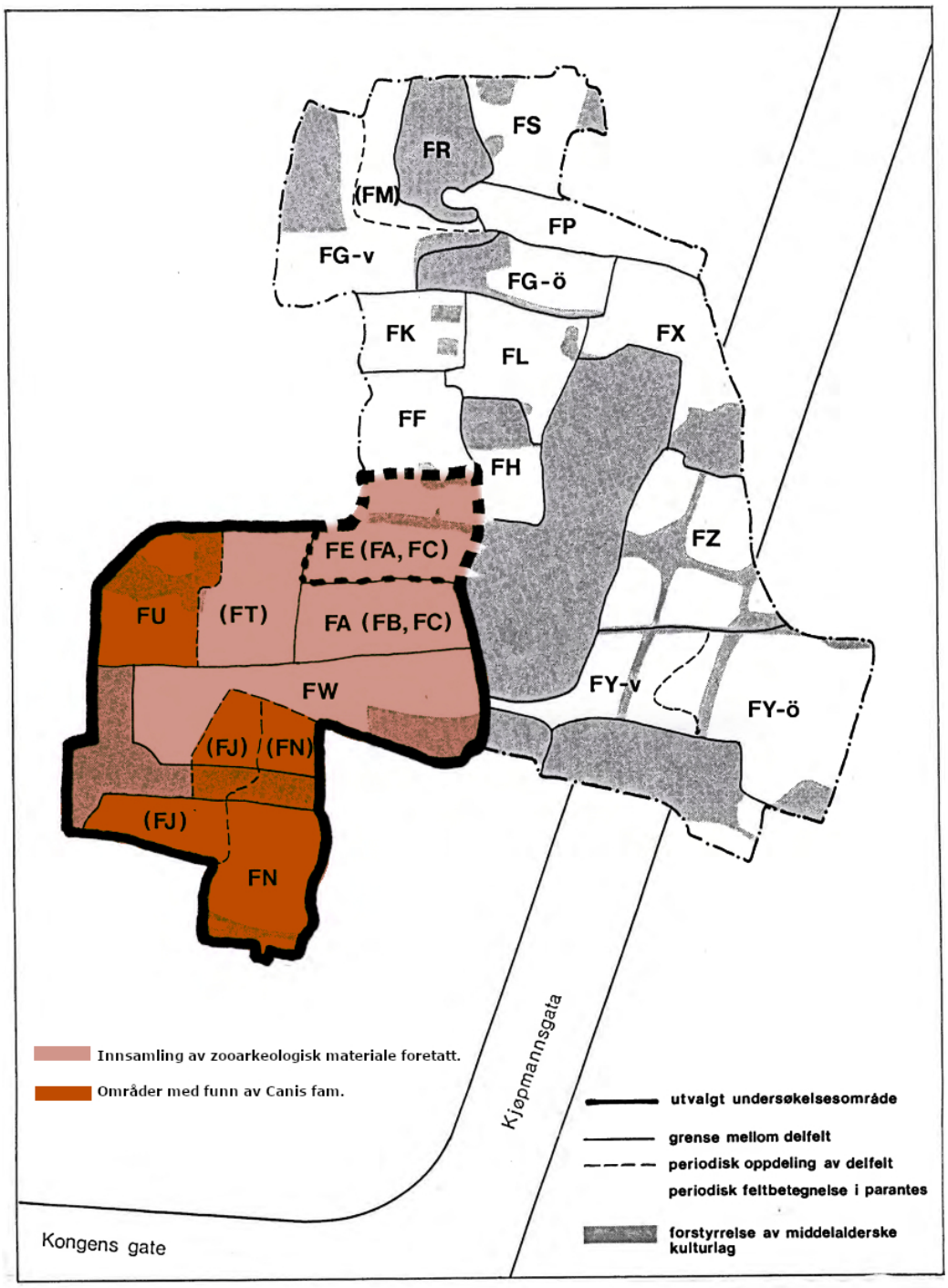

Bryggen project excavated area
MARIAKIRKEN
ØVREGATEN
Schøtstuene
Bryggestredet
Jacobsfjorden
Bellgården
Holmedalsgården
NIKOLAIKIRKEALMENNINGEN
DREGGSALMENNINGEN
Bredsgården
Enhjørningen
Steensgården
Baggården
BRYGGEN
0
50 M

Appendix 3

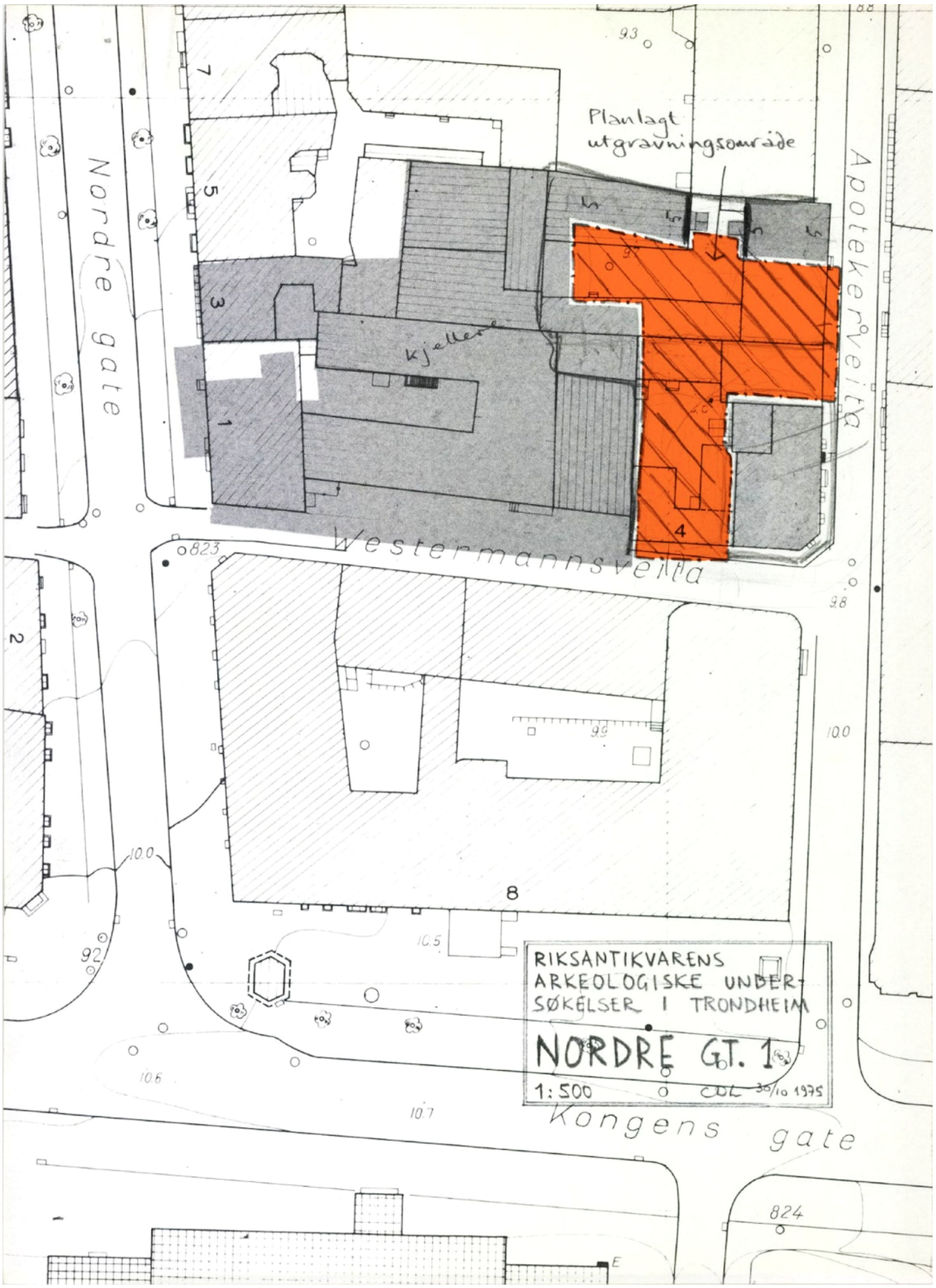


Bryggen, Bergen: utgravningsfeltet på Dreggsalmenningen
(tidligere utgravninger merkert med årstall)

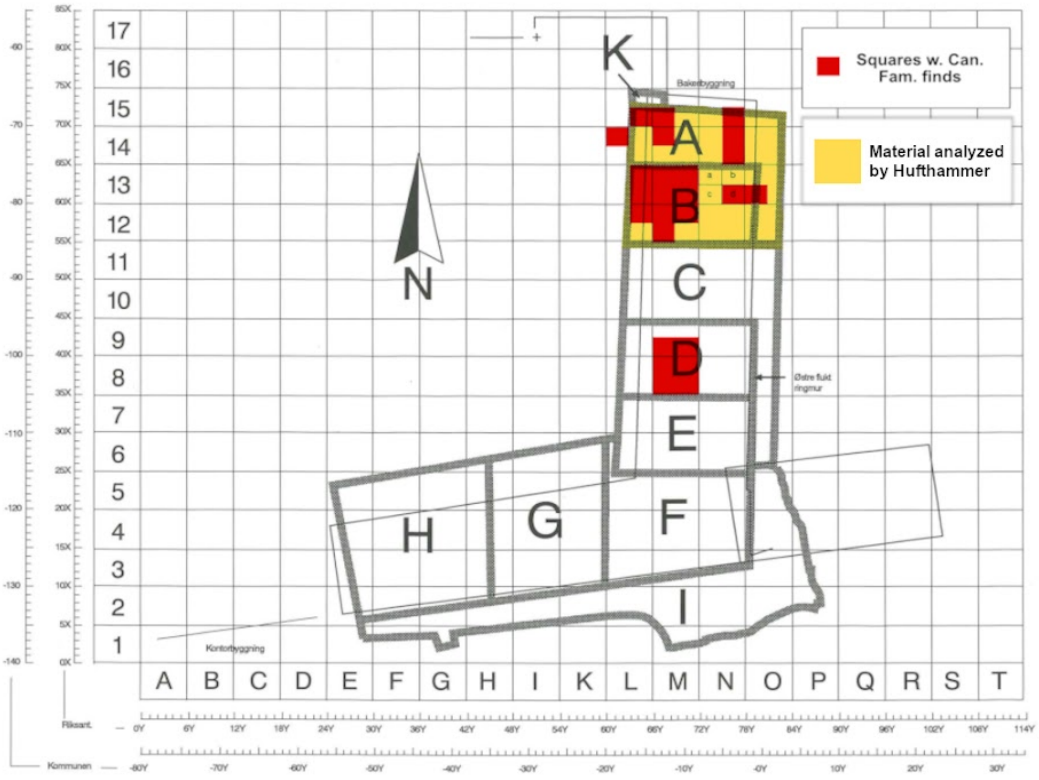
Appendix 4

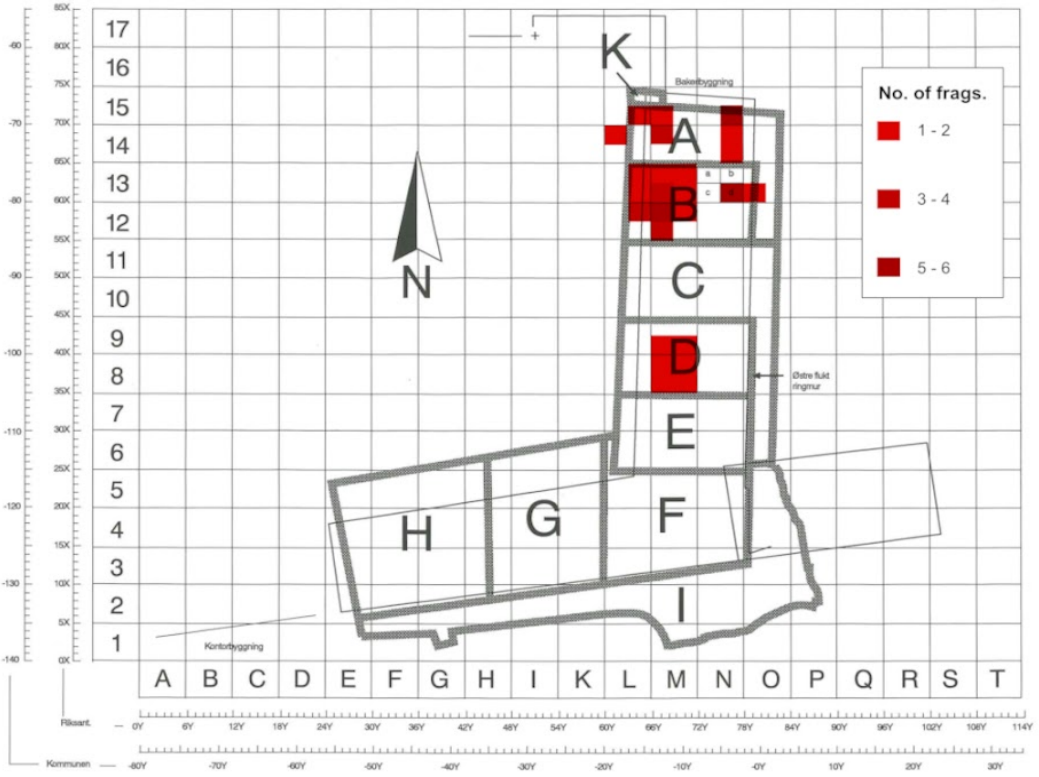

FS
FR
(FM)
FP
FG-v
FG-ö
FK
FL
FX
FF
FH
FZ
FE (FA, FC)
FU
(FT)
FA (FB, FC)
FW
FY-v
FY-ö
(FJ)
(FN)
(FJ)
FN
Kjøpmannsgata
Kongens gate
Innsamling av zooarkeologisk materiale foretatt.
Områder med funn av Canis fam.
utvalgt undersøkelsesområde
grense mellom delfelt
periodisk oppdeling av delfelt
periodisk feltbetegnelse i parantes
forstyrrelse av middelalderske kulturlag
FOLKEBIBLIOTEKSTOMTEN
Oversikt over delfelt
1:500
10 m
N

Appendix 5

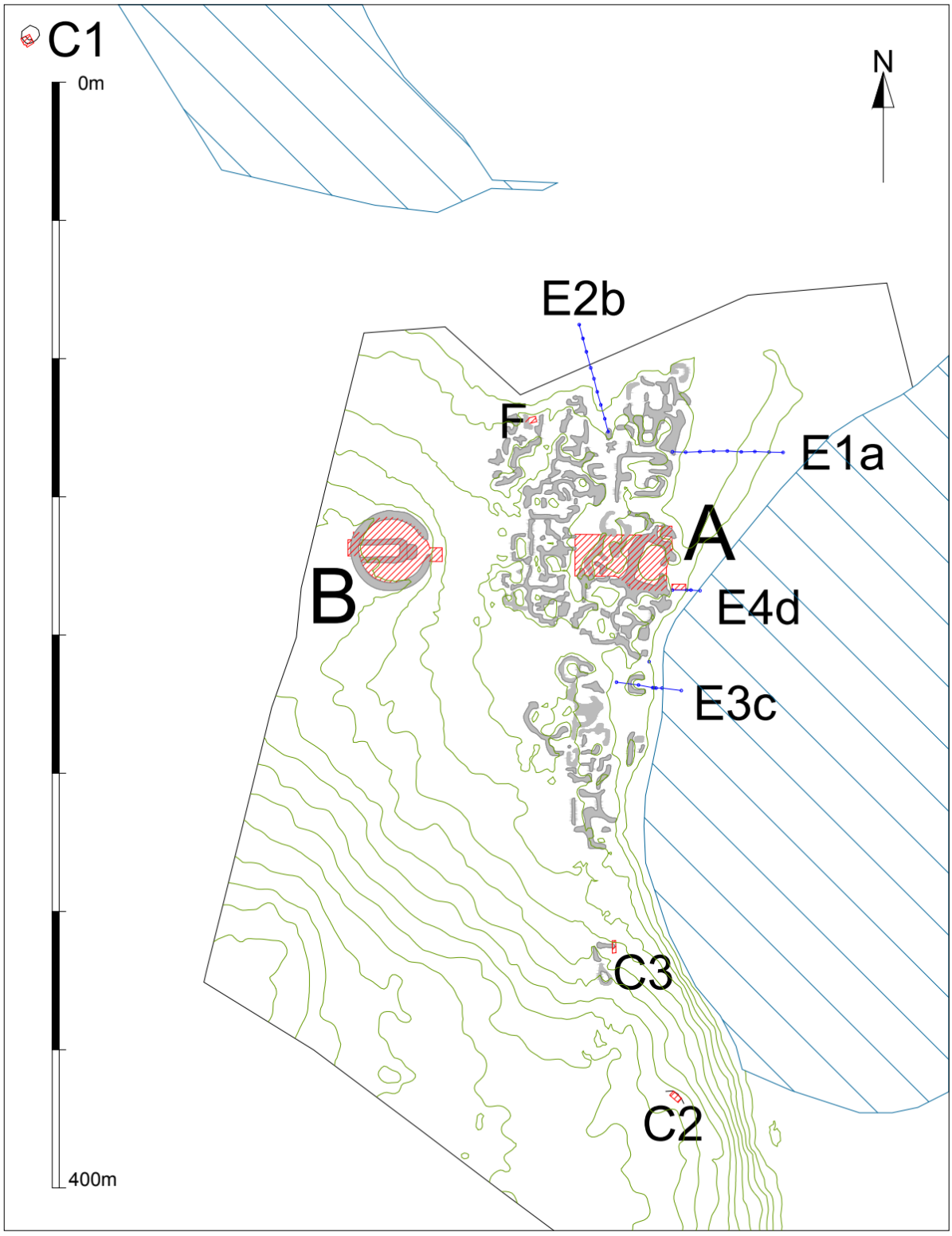

Nordre gate
Apotekergata
Planlagt utgravningsområde
Kjellere
Vestermannsveita
Kongens gate
RIKSANTIKVARENS ARKEOLOGISKE UNDERSØKELSER I TRONDHEIM
NORDRE GT. 1
1:500
30/10 1975

Appendix 6

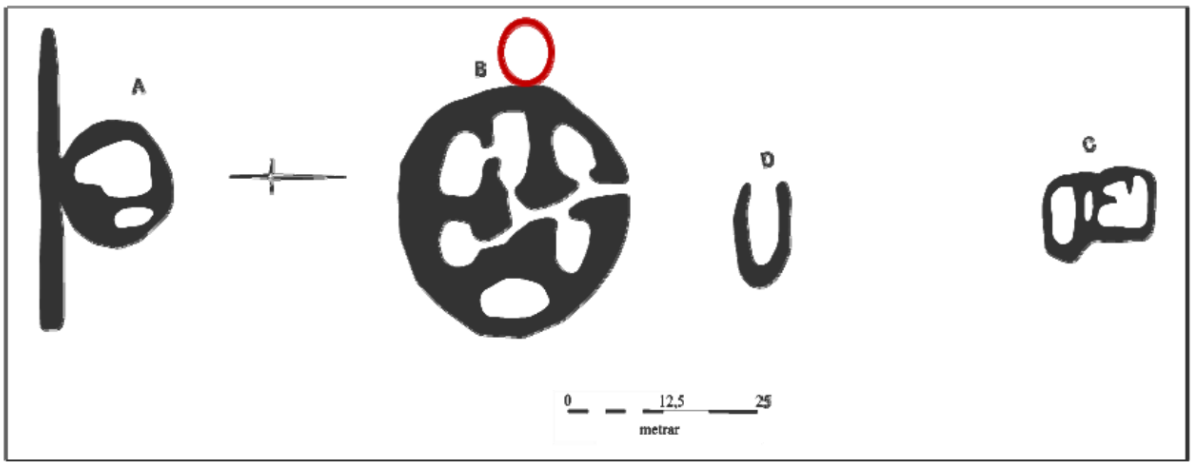

Squares w. Can. Fam. finds
Material analyzed by Hufthammer
N
K
A
B
C
D
E
F
G
H
I
Bakerbygning
Østre fuld ringmur
Kontorbygning
Riksant.
Kommunen


No. of frags.
1 - 2
3 - 4
5 - 6
N
K
A
B
C
D
E
F
G
H
I
Bakerbygning
Østre fuld ringmur
Kontorbygning
Riksant.
Kommunen

Appendix 7



Appendix 8



Appendix 9

Comparative material used									
	Dog A	Dog B	Dog C	Fox A	Fox B	Fox C	Wolf A	Wolf B	Wolf C
Museum I.D.	B.M. 3841	(B.M.) 2860	B.M. 4697 (H.396)	B.M. 3912	B. 7530	B. 157	B. 2	B. 20	B.M. 2600
Species	Canis fam.	Canis fam.	Canis fam.	Vulpes vulp.	Vulpes vulp.	Vulpes vulp.	Canis Lupus	Canis Lupus	Canis Lupus
Breed	Grey Nor. elkhound	Gordon setter	German sheph.	-	-	-	-	-	-
Sex	female	male	male	male	-	female	male	female	male
Given name	*Penny II*	-	-	-	-	-	-	-	-
Age at death	12 yrs.	-	6,5 yrs.	-	-	-	-	-	-
Location of aquirement	Ski, Akershus (Viken)	-	-	Eidfjord, Hardanger	-	Eidfjord, Hardanger	Svartevassbotn, Naustdal, Sogn og Fjordane (Vestland)	Karasjok	Sarikoski, Karesuanda, Sverige (SV)
Date of registration	22.08.1922	28.12.1916	05.02.1954 (06.06?.20?12)	04.12.1923	04.11.1997	?.05.1954	11.11.1950	28.03.1951	01.08.1915
Elements used in study, as size and morphological references	tibia, radius, cranium, scapula, femur, ulna, humerus	atlas	cranium (half)	atlas, pelvis, scapula, sacrum	cranium	mandible	pelvis	mandible	cranium
Reconst. sh. hight	45,25 cm	-	-	-	-	-	-	-	-

Appendix 10

All bone material - Skeletal elements as by locations								
Skeletal element	Bryggen	Dreggen	TVT	FBT	EBG	Gásir	Oddstaðir	**Total**
Skull	13	4				3	3	23
Mandible	8	6			6	5		25
Teeth	8	2			5	24		39
Atlas			2			1		3
Vertebra	2		2		6	1		11
Scapula		3	2		3	1		9
Humerus	2	5	2	1	6	4		20
Radius	4	3	3	1	5	1		17
Ulna	1	3	2		2	2		10
Metacarpals					4			4
Phalanges					1			1
Rib	2				1			3
Sacrum						1		1
Pelvis / Innominate	2				1		2	5
Femur	2	3	4	1	3			13
Tibia	2	2	6	3	4	1		18
Fibula			1		3			4
Tarsals					1			1
Metatarsals					1			1
TOTAL	46	31	24	6	52	44	5	208

Appendix 11

Gnaw marks identified in skeletal elements - as by locations

Skeletal element	Bryggen		Dreggen		TVT		FBT		EBG		Gásir		Oddstaðir		**Total**
	clear	pot.	clear	pot.	clear	pot.	clear	pot.	clear	pot.	clear	pot.	clear	pot.	
Mandible		2													2
Scapula				1											1
Humerus		1	1	1											3
Radius		1													1
Ulna			1	1											2
Pelvis / Innominate		1													1
Femur				1											1
Tibia			1												1
TOTAL	0	5	3	4	0	0	0	0	0	0	0	0	0	0	12

Appendix 12

Pathology and potential pathology in skeletal elements - as by locations

Skeletal element	Bryggen		Dreggen		TVT		FBT		EBG		Gásir		Oddstaðir		**Total**
	clear	pot.	clear	pot.	clear	pot.	clear	pot.	clear	pot.	clear	pot.	clear	pot.	
Skull		2		3								1			6
Mandible				1						1					2
TOTAL		2		4						1		1			8

Appendix 13

Tool marks identified in skeletal elements - as by locations

Skeletal element	Bryggen		Dreggen		TVT		FBT		EBG		Gásir		Oddstaðir		**Total**
	clear	pot.	clear	pot.	clear	pot.	clear	pot.	clear	pot.	clear	pot.	clear	pot.	
Skull	2	4	1	3											10
Mandible	3	2								4					9
Atlas					1										1
Scapula						2				1					3
Humerus		1	1	2	2					4					10
Radius		2		1	1	1	1	1		3					10
Ulna			2	1		1									4
Metacarpals										1					1
Phalanges										1					1
Rib										1					1
Pelvis / Innominate	1														1
Femur	1		1		1	2				2					7
Tibia	1			1	1	4		2		1					10
TOTAL	8	9	5	8	6	10	1	3	0	18	0	0	0	0	68

Innlevering: Høst 2022 (1. Februar 2023)

Veileder: Ramona Harrison

Kandidatnr.: 125

Antall ord: 32’610

(Ordtall er ekskluderende tabeller, litteraturliste, og vedlegg).