Master's thesis

NTNU
Norwegian University of Science and Technology
Faculty of Humanities
Department of Historical and Classical Studies

Clara Margarete Gärtner

Skeletons in the Closet

Estimation of biological sex from skeletal remains and archaeological material from Sandvika, Jøa.

Master's thesis in Archaeology
Supervisor: Ingrid Ystgaard
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May 2023

Left side of mandible from A4992 (Photo by author).

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i Abstrakt

Arkeologer har brukt gravgods for å trekke konklusjoner om biologisk kjønn i svært lang tid. Det har vært enkelttilfeller hvor disse konklusjonene har blitt bevist feil ved bruk av aDNA og andre vitenskapelige analysemetoder. Denne oppgaven forsøker å vurdere sammenhengen mellom gamle biologiske kjønnsestimeringer og nye biologiske kjønnsestimeringer med bruk av oppdaterte metoder. Samtidig blir forholdet mellom kjønnsbestemmelser basert på osteologiske levninger og arkeologisk materiale diskutert ved bruk av de menneskelige levningene fra sittegravene på Jøa som casestudie.

Av de 24 gravene på lokaliteten hadde 14 bevarte levninger. I denne oppgaven ble 14 levninger analysert, selv om det under analysen ble tydelig at det var noen utfordringer, som forsvunne individer og blandete levninger som ble angitt som bare ett individ i den opprinnelige utgravningsrapporten. Individene ble analysert sist på 1960-tallet, og etter å ha fullført analysen for denne oppgaven med nyere osteologiske metoder ble det tydelig at mange av estimatene av biologisk kjønn ikke stemte overens med de fra 1960-tallet. Dette tilsier at levninger som sist ble analysert for flere år siden bør analyseres på nytt for at informasjonen om levningene skal være oppdatert.

Fra sammenligningen mellom det biologiske kjønn estimert gjennom osteologisk analyse og det estimerte biologiske kjønn ved bruk av gravgods er det noen resultater som stemmer overens og noen som ikke gjør det. Dette kan skyldes metodene som ble brukt under den osteologiske analysen (de fleste individene hadde kun hodeskallen bevart, ikke bekkenet, så hodeskallen var ofte den eneste basisen for estimeringen av biologisk kjønn, men det kan også være en indikator på den teoretiske ideen om at biologisk kjønn og sosialt kjønn ikke er det samme og at sosialt kjønn ikke er den sosiale konstruksjonen av biologisk kjønn.

Det ble også tydelig at det faktum at Norge mangler standarder når det gjelder utgravning, dokumentasjon og kuratering av menneskelige levninger har ført til et betydelig tap av kunnskap over tid. Dette har blitt tydelig gjennom at det har vært problematikk rundt organisering og dokumentasjon av levningene, og det er få kilder som detaljerer tolkningene og beslutningene som ble tatt angående levningene gjennom hele utgravnings- og kurasjonsprosessen.

ii Abstract

Archaeologists have used grave goods to draw conclusions about biological sex for an exceptionally long time. There have been individual cases where these conclusions have been proven wrong using aDNA and other scientific methods of analysis. This thesis attempts to evaluate the correlation between earlier osteological sex determinations and new osteological sex determinations with up-to date methods, and at the same time discuss the relationship between sex determinations based on osteological remains and archaeological material.

Out of the 24 graves at the site, 14 of them had preserved remains. This thesis looked at 14 individuals, though during analysis it became evident that there were some challenges, such as missing individuals and comingled remains that were indicated as only being one individual in the original excavation report. The individuals were analysed last in the 1960s and after completing the analysis for this thesis with newer osteological methods it became evident that many of the estimations of biological sex did not match up with the ones from the 1960s. This would indicate that older remains should be reanalysed in order for the information on the remains to be updated.

From the comparison between the biological sex estimated through osteological analysis and the estimations using grave goods some estimations match up and some do not. This could be due to the methods used during the osteological analysis (for most individuals only the skull was preserved, not the pelvis), but could also be an indicator of the theoretical idea that biological sex and social sex are not the same and that social sex is not actually the social construction of biological sex. It also became evident that Norway lacks standards for the excavation, documentation and curation of human remains has led to a significant loss of knowledge over time. This has become clear through the fact that there have been challenges surrounding the organisation and documentation of the human remains, and there are few sources that detail the interpretations and decisions that were made regarding the remains throughout the excavation and curation process.

iii Acknowledgements

First of all, I want to thank my thesis supervisor Ingrid Ystgaard for helping me make this thesis a reality. When I came to her I had a vague idea of what I wanted to look at, and with her help I was able to create a thesis I am happy with. I also have to thank my co-supervisor Nina Elisabeth Valstrand for guiding me when it came to the actual osteological methods and analysis. Both my supervisors made this an interesting thesis to research and write.

I also want to briefly thank Dr Amy Gray-Jones for getting me interested in osteoarchaeology in the first place through her module *The Archaeology of Human Remains* that I did during my bachelor's degree at the University of Chester. Osteoarchaeology has become something I wish to continue with, especially after writing this thesis.

I must also thank Dr Sean Denham for answering any and all questions I had along the way and providing me with the form that served as the basis for the forms used to collect the results of my analysis.

Finally I also have to thank my classmates, friends, and family for continuous and unwavering support to my thesis and my degree.

iv Table of Contents

vi List of figures

vii List of tables

Chapter 1: Introduction

The sitting burials from Sandvik (on Jøa, near Namsos) are well known in Norway and the significance of the unusual burial custom has been researched and discussed previously by scholars (Marstrander 1978; Mokkelbost, 2007). The rarity of the material cannot be overstated. There are exceptionally few sitting burials, not only in Norway, but in Scandinavia in general (Marstrander, 1978). However, the skeletal remains from the burials have not been analysed using osteological methods since the 1960s (Getz, 1966), meaning there is more we can learn from these burials. For some of the individuals the grave goods were used to estimate biological sex, as has been done for a long time (Weglian, 2001). With newer osteological methods there is potential to collect new and updated information, and through this data learn more about the differences and similarities between age groups, biological sex, and health (pathology). A new theoretical discussion has also been developed since the 1980s highlighting the connection between grave goods and how an individual presented themselves. Finally, estimation of biological sex and its link to social sex have changed since the 1960s both from a theoretical as well as a methodological standpoint, making these remains ready for new analysis.

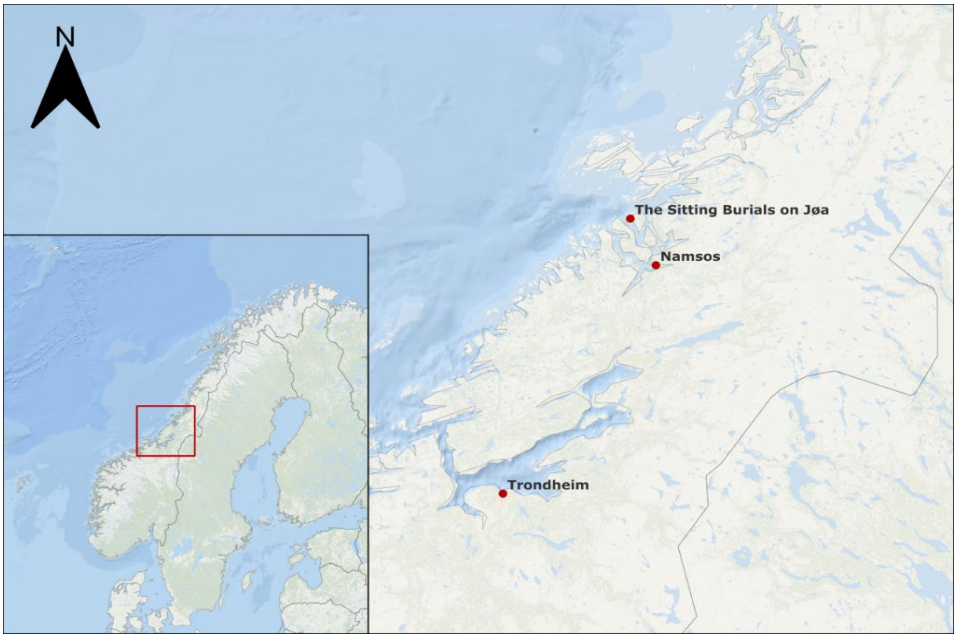

Figure 1: Map showing the sitting burials on Jøa in relation to Namsos and Trondheim (Map Fanny Sikström).

1.1 Introducing the burials on Jøa

In 1963 a farmer on the island of Jøa, near Namsos, Norway, accidentally uncovered human remains while removing sand 500 meters northwest of the Sandvik farm (Mokkelbost, 2007, p. 2). This area is within the jurisdiction of Vitenskapsmuseet in Trondheim and so they were called to have a look at the burials and consider further action. Sverre Marstrander was the head of the museum at the time and therefore travelled out to Jøa to assess the situation and decide what would be done. Marstrander describes in the yearbook for Namdalen from 1978 that when he arrived four of the graves were open and visible. They found eight more over the next few days, and after removing the topsoil 12 more graves became visible as dark, round imprints in the shell sand layer. Overall, 24 graves were registered at the site. Over the summers of 1965 and 1966 they completed a systematic investigation of the site. It was found that all the graves were cut into the shell sand with only two graves (X and XXI) being so deep that they partially cut into a grey, sterile layer underneath the shell sand. Most of the graves were filled with greasy black ash soil and several of the graves had fireclay stones in them. The fire cracked rocks, and ash soil in rounded pits are usually characteristics of cremation burials; however, in this case the burials were inhumation burials.

The most unusual aspect of the graves was that some of the interred individuals were clearly buried in a sitting position (see Figure 1). Marstrander (1978) states that it was most obvious in Grave V, which contained an untouched and well-preserved skeleton that was sat at the bottom of the pit. The lower extremities were underneath the pelvis. Four of the other burials were also found in the same or a similar position, some showing indications of the upper body having fallen forward possibly due to taphonomic processes. Several of the graves contained grave goods, though the number of grave goods and type of grave good varied substantially. There were several brooches deposited in the graves, and these were the basis for Marstrander's dating. The site was dated to the Merovingian/Viking Age, as the brooches indicated use over several hundreds of years (Marstrander, 1978).

Figure 2: Individual buried in a sitting position in Grave V (A4993) (Photo NTNU Vitenskapsmuseet)

1.2 Aim and research objectives

The main aim of the thesis is to evaluate the correlation between earlier osteological sex determinations and new osteological sex determinations with up-to date methods, and at the same time discuss the relationship between sex determinations based on osteological remains and archaeological material. Due to the acidic soil in Norway, skeletal remains are usually badly preserved making it challenging to use them for osteological analysis and for demographic statistics. There is also a significant amount of cremation burials (Solberg, 1985; Sellevold, 2011). It is because of these two challenges that archaeologists have used grave goods to make biological sex estimations in Norway. At the same time, there has been a developing discussion concerning whether grave goods can be used to estimate sex, and the limitations and biases involved in this method (Moen,

2019a). Three underlying research questions have been developed in order to reach the main aim:

1. Is the sex, as estimated through newer osteological methods the same as the sex, as estimated previously?

2. Is the sex, as estimated through osteological analysis, and the sex, as estimated through grave goods, the same?

3. If the osteologically estimated sex and the sex as estimated through grave goods do not match up, why may this be?

The thesis will consider the theoretical implications of the answer to the main aim and the research questions, specifically the third research question. The thesis will add to the growing corpus of research into biological sex and social sex, their differences and similarities and what role they play within archaeology. Archaeologists (primarily in the past) have used grave goods to determine the biological sex of the individual buried; however, this is generally done by using 'common sense' rather than research (Weglian, 2001). Most commonly these estimations are influenced by gender roles and gender stereotypes of the time (Moen, 2019a, pp. 117-118). Burial rites differ depending on time period and geographical region. This means that research on grave goods and biological sex from Medieval Italy will most likely differ from the same research on Iron Age burials in Iceland. It is near to impossible to draw general conclusions about all time periods and geographical locations based on research this narrow; however, it is still a relevant and important question to answer as this research will join a larger corpus of research regarding the potential connection between biological sex and grave goods.

Following the osteological analysis a fourth research question was added after encountering several problems with the skeletal remains that were not foreseen; problems that indicate a larger issue concerning curation, the role that context plays, and what role these two things play in the loss of knowledge surrounding human remains, specifically in Norway. Through this research question the thesis aims to highlight the importance of being critical of which sources are used and what these sources actually represent.

4. To what degree have excavation methods and curation processes affected the scientific value of the studied human remains?

1.3 Terminology

Although many of the terms listed below will be discussed and defined further in later chapters, it was deemed useful to add a short and simplified definition of some of the terms that will frequently be used in the thesis right at the beginning. It is important to note that these terms are likely more complex and nuanced than the definitions given here, which will be part of later discussions and considerations.

Biological sex: This term refers to the biological idea of sex, which is dictated by your chromosomes. When referring to biological sex in this thesis, the binary male or female is what is meant, as chromosomal/biological outliers are difficult, if not impossible, to distinguish based purely on skeletal remains.

Social/Cultural sex: This is more akin to what we may today refer to as gender. This term reflects someone's role in a community or how someone presents themselves.

Biological age: This refers to what age the skeleton appears through osteological assessment. Biological age can be affected by profession (for example: farmers do a lot of physical labour that may wear their skeletons giving a higher biological age). Also sometimes referred to as 'age at death'.

1.4 Limitations and conditions

Sverre Marstrander dated the site to the Merovingian - Viking age, ca. 650 AD to 1000 AD, based on the typology of the grave goods found in the burials, specifically the decoration on the brooches (Marstrander, 1978, p.28). This thesis accepts and follows this scientific dating through typology, and it has not been a priority to verify this dating using any absolute dating or other methods. The dating and archaeological context is relevant for the discussion of the thesis, as cultural attitudes towards gender roles and burial rites vary between time periods and geographical locations. However, what is most important is that the burials are all from the same period as knowledge concerning the period's views on material culture are essential to the final discussion. For this project the physical grave goods were not viewed in person, due to the thoroughly presented description in Marte Mokkelbost's work from 2007 which highlights that most of the grave goods are in quite bad condition, except for one bronze ring, the glass pearls, some of the brooches and the bone comb. There are images and descriptions available through the online collections portal

belonging to Vitenskapsmuseet, as well as descriptions in articles and reports written by Marstrander, which this thesis has used as a basis for the analysis and discussion of the grave goods.

As will become clear in later chapters, the analysis of the skeletal remains became more complex and confusing due to several challenges that became clear during the analysis. Most of these challenges stem from the excavation or the time that the material has spent at the Anatomical Institute. These issues and how they specifically affected this thesis and how these challenges were dealt with will be described in a later chapter. However, it is important to be aware that there is only so much a student can do within the scope of a master's thesis with the time, resources, and framework they are given. The discussion of the issue of curation and handling of skeletal remains in Norway could have been a thesis topic in itself. It will be discussed, but not in full detail and scope, but rather in its relation specifically to this case study, and possibly drawing some general conclusions where appropriate.

- Late start due to many actors involved in getting access to the material.

It is also important to point out that the remains that have been analysed for this thesis are not representative of the Late Iron Age population as a whole. The unique burial style and inclusion of some grave goods could denote the group of individuals as possibly of high status or simply as different, as suggested by Mokkelbost (2007). As will be shown in the results, females are more represented than males. Dommasnes (1982, p. 73) has in her work stated that "it must be assumed that the male/female ratio is a constant at about 1:1"; however, Solberg (2003, p. 169) has stated in his work that the ratio between male and female burials in the Viking age is closer to 5:1.

1.5 Structure

Chapter 2 outlines the relevant background and context to be able to understand and build a basis for the discussion that comes later in the thesis. Chapter 3 outlines some of the relevant theories; in this case both gender theory and collection theory. Chapter 4 describes the material itself and some of the problems that were encountered during the analysis and the relevance of these problems towards the thesis itself and osteoarchaeology in Norway in general. Chapter 5 describes the methods used during the osteological analysis of the skeletal

material, and chapter 6 then presents the results from this analysis. Chapter 7 will contain the discussion, where the research questions and the main aim will be answered and discussed based on the data from the analysis and the previously presented theory and secondary literature. Chapter 8 will be the final conclusions of the thesis in regard to the previously stated research questions and the main aim, as well as recommendations for further research.

Chapter 2: Background and Context

2.1 Discovery, excavation and dating of the Sitting Burials on Jøa

The graves on Jøa were found in the early 1960s by a farmer that was removing sand from his property. As bones began emerging from the sand it became apparent that these were not animal bones as first thought, but instead human bones. Vitenskapsmuseet in Trondheim was notified, and it was Sverre Marstrander, manager of the antiquarian department, who travelled out to the island in order to survey the site. Four of the graves were visible in the light shell sand as dark cylindrical pits, and they had been partially removed. As Marstrander surveyed more of the site, several more graves were discovered. The burials from Jøa were noteworthy due to the fact that some of the interred had been buried in a sitting position, something which was, and still is, unique in Norwegian archaeology (Marstrander, 1978). There is no description of the position in which the other individuals were buried, and it is difficult to infer this from the drawings made of the graves.

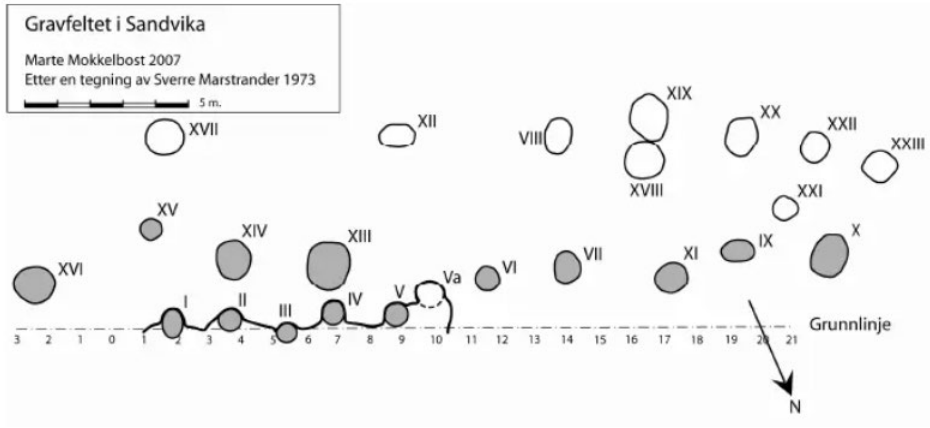

Figure 3: Illustration of the excavated site with the graves labelled. The grey coloured graves are graves with skeletal remains (Illustration by Marte Mokkelbost, 2007 after drawing by Sverre Marstrander).

Graves I - IV were all completely or mostly uncovered by the time Marstrander arrived at the site, meaning they were partially excavated by non-archaeologists and have poorer discovery contexts. In the summer of 1963, graves V, VIII and IX were examined, and this

is when mayor Rolf Aarmo discovered an oval brooch which ultimately led Marstrander towards dating the site to just prior to the Viking Age: the 8th century. The rest of the site was systematically excavated in the summer of 1965 and 1966, and 24 graves were found altogether within the area, though only some of the graves contained skeletal remains. During the excavations, Marstrander measured and drew both the plan and profile view of all of the graves. It is also indicated in these drawings in which position the skeletal remains were found as well as where the grave goods were found. In the yearbook for Namdalen, Marstrander details his analysis of the brooches found at the site and he concludes with dating the site to the Merovingian/early Viking period, as can be seen in Table 1 below (Marstrander, 1978). Based on the typology of the brooches the graves were dated to between 650 AD and 1000 AD (Marstrander, 1978). These dates fall within the time period known as the Late Iron Age in Norway, which starts ca. 550 AD and last until 1050 AD (Skipstad, 2009).

Figure 4: Oval bronze brooch from Grave VII (T18646) (Photo NTNU Vitenskapsmuseet)

Grave number	Dating
Grave VII	Ca. 650 – 700
Grave X	Ca. 650 – 725
Grave XIV	Ca. 700-750
Grave II	Ca. 750 – 800
Grave V	Ca. 800 - 1000

Table 1: Dating of graves based on brooches (as seen in Marstrander, 1978).

Some of the human remains were sent to the Anatomical Institute for osteological analysis, which was most likely done by Getz. The individuals from Grave IV and VI were seemingly not sent to the Anatomical Institute. The letters sent by Getz in 1966 to Marstrander concerning some of the skeletal remains and the original report written by Marstrander (1968) indicate that several of the biological sex estimations were made based on what the skeletal elements looked like and their size. Unfortunately, there is no other indication as to what methods were used to establish the biological profile.

2.2 The Late Iron Age

The Late Iron Age includes both the Merovingian Period and the Viking Age. The Merovingian period covers the time span of ca. 570 AD until 800 AD, and in Norway the transition from the Migration Period to the Merovingian period marks the transition from Early to Late Iron Age (Østmo & Hedager, 2005, Solberg, 2003). The start of the Merovingian period is denoted by the transition from Salins style I to Salins style II. Housing in the Merovingian period is mostly the same as can be found in the Migration Period, and throughout the Merovingian period there is an increase in livestock (Østmo & Hedager, 2005). In the Merovingian Period there are rituals tied with burials and graves, and compared to the Migration Period there is a simplification in burial structures and grave goods in the early phase of the Merovingian Period (Øtsmo & Hedager, 2005; Solberg, 2003). However, in the latter half of the period burial mounds and boat graves with rich grave goods become the standard once again (Østmo & Hedager, 2005; Solberg, 2003). Norway, as a whole, see a decrease in male graves in the Merovingian period, but there is an even greater reduction in female graves, which has been interpreted as the result of social equalization. Though it is important to note that this does not mean that their society was egalitarian (Østmo & Hedager, 2005, p. 243). The transition between the Merovingian period and the Viking Age is denoted by, amongst other things, the change to Salins style III; however, as Myhre (1998) argues in his work, this cultural transition was not as abrupt or radical as is often postulated. The Viking Age has been studied in detail in Norway, probably due to the fact that grave goods, specifically tools and weapons made of iron, are well-preserved, and a lot of it has been discovered (Sognnes, 1988, p. 7). The Iron Age in Norway is the time period that is the most richly represented by finds,

therefore we have a lot of knowledge about the time period and the cultures, societies, and rites present (Rygh, 1877, p. 7, Solberg, 2003). As men started travelling more throughout the Iron Age, women took on more responsibilities on the farm, which led to an increase in authority in the community (Farbregd, 1988, p. 67). Is this change reflected in the material?

2.2.1 Trøndelag and Namdalen in the Late Iron Age

Kalle Sognnes (1988) has written a work that suggests how society was organized in the Late Iron Age in Trøndelag. In his work he concludes that Namdalen, specifically Overhalla, was most likely a centre of society that held influence over the smaller local villages. Sognnes (1988) uses statistical analysis of grave goods to come to this conclusion as there was little other analysed and excavated material at the time he was writing. Sandnes (1965, p. 88), suggests that archaeological excavations and surveys have had a focus of the inland areas of Namdalen, rather than the coastal regions, due to the systematic and detailed excavations of 85 burial mounds done by Theodor Petersen (Vitenskapsmuseet Trondheim) in Overhalla, between 1902 and 1906. All visible monuments have been documented in both the municipality of Overhalla and the municipality of Grong, which includes over 1200 burial mounds and other burials. As is highlighted in Pettersen's (1988) article, boat graves have been very prevalent in Namdalen, especially in the Late Iron Age. 22 boats or parts of boats have been discovered, as well as disturbed rivets, that most likely stem from boats, from 21 burials. For some perspective, in the region of Nordland and north there are only 30 confirmed boat graves, and slightly over 50 if disturbed finds of rivets are included (Pettersen, 1988). Initially it was thought that the boat burial tradition most likely came to Namdalen from Sweden, as similar boat graves have been found in Uppland; however, the boat burial tradition has been found along the entire coast of Norway, highlighting its connection to trade and travel through water (Pettersen, 1988; Solberg, 2003). Pettersen (1988) also highlights that Namdalen most likely was a centre for boat building and coastal travel. This is reflected in the finds of rivets, boat parts, and axes, as well as the boat burials themselves. In Trøndelag, 684 iron smelting sites have been discovered, a large proportion of them concentrated on the inland area, and they have been dated to between 300 BC to 1500 AD (Stenvik, 2005a).

2.2.2 Burial, material culture, and biological sex

Late Iron Age burial customs are uniform all over the country, though they are uniform in their variation (Dommasnes, 1982, p. 71). The number of artefacts deposited in graves can vary from one to 100, and the Merovingian Period sees a large number of tools laid down in graves (e.g. weapons, blacksmith's tools, cooking and weaving utensils and agricultural implements). The custom of laying down artefacts in graves could not have been practiced by all, only those with the economic resources (Dommasnes, 1982, p. 71). It is important to remember that "the deceased did not bury themselves and that consequently, there is never a direct and uncomplicated relationship between the grave goods and the social identity of the deceased" (Lund & Moen, 2019, pp. 142-143). Similarly, Pearson (2003, p. 9), highlights that it is the living who carry out a burial and the rites associated with the burial, meaning that the dress and the grave goods in the grave constitute how the living perceived the individual. As Moen (2014, pp. 130-131) states in her work, it was shameful for men to behave like women, yet women that acted like men was seen as something positive. Weglian (2001) argues that gender in the Viking age can be modelled following Lacquer's one-sex model, meaning there was only male or nonmale, but these categories were not limited by biology.

One of the ways to establish connections between estimated biological sex and material culture, is through the analysis of burials that have preserved skeletal remains. Unfortunately, as previously stated, there are few inhumation burials with preserved human remains, due to the acidic soil in Norway. However, the prevalence of cremation as a burials custom has also impacted the number of preserved human remains that are available for analysis (Solberg, 2003). There has been done research on the inhumation burials that do have preserved remains in relation to assessing links between biological sex and grave goods. For example, blacksmith's tools are found overwhelmingly in male burials, though there are some exceptions (Dommasnes, 1982, p.76; Gudesen, 1980, p. 83). Similarly, certain brooches (conical, oval, wheel- and bird shaped brooches) are found almost exclusively in female burials (Gudesen, 1980, p. 84). Rødsrud and Røstad (2020, p. 177) have looked at the bird shaped brooch and its significance in Norway, and state that this type of brooch was most likely used as jewellery by women, as men in the Early Merovingian Period rarely or never used brooches. It is most common to find these brooches in pairs, as they were commonly worn

in pairs on what is traditionally known as women's dress (Østmo & Hedager, 2005, p. 438; Moen, 2019a, pp. 124-125). Textile implements are most commonly found in female graves (Stenvik, 2005b; Moen, 2019a, p. 126), agricultural tools are more common in female graves (but always a sickle highlighting the link to harvesting specifically), cooking utensils are only slightly more common in female graves than in male graves. Keys (usually of bronze) are also commonly found in female graves, thought to be related to their status as in charge of the home (Solberg, 1985). Carpenter's, hunter's, and merchant's tools are almost exclusively found in male grave's, though there are exceptions in Sogn and at Hopperstad in Vik where arrowheads are found in female graves (Dommasnes, 1982, pp. 76-77). Tools for trade such as scales have been discovered in female burials, though this also contradicts gender stereotypes (Stenvik, 2005b). Archaeologists have previously considered all jewellery to point to a female grave, including pearls; however, as Haugen (2009) presents in her work, men also used pearls. Johansen (2004) also highlights that female burials often have three or more beads, whereas male burials usually contain fewer (usually one).

Weapons are generally associated with male graves, through there are exceptions to this rule as well. Axes are commonly found in female burials, which is unique to Norway (Moen, 2019a, p. 126). The most common weapons in the Merovingian period are "swords, spears, axes, arrowheads, and shields"[1] (Solberg, 2003, p. 190). There are changes in the weapons' design from the Pre-roman era and the Migration period, for example, swords go from a double-edged design to a single-edge design. However, many of these weapons also change in design throughout the Merovingian period, though never drastically. Swords, for example, also become longer (Solberg, 2003). Moen (2019a, p. 127) highlights that there are several items that have previously been assumed to denote a male grave, such boats, riding equipment, and other equipment related to travel, which have also been found in female burials in Norway. There are also items, such as cooking equipment, which was connected to female burials; however, it is equally as common in male burials as it is in female burials (Moen, 2019a, p. 127).

[1] Translated by author, "sverd, spyd, øks, pilspisser og skjold»

2.3 Physical anthropology and osteoarchaeology in Norway

2.3.1 The terms 'physical anthropology' and osteoarchaeology'

The first thing that must be established are the terms 'physical anthropology' and 'osteoarchaeology', how they are connected, and also how they differ. It is easier to understand these two terms if we define the terms 'anthropology' and 'archaeology' first. Anthropology is, in the simplest terms, "the study of humanity - our physical characteristics as animals and our unique non-biological characteristics that we call culture" (Renfrew &Bahn, 2020, p. 12). In some countries archaeology is a sub-discipline of social anthropology (e.g. the United States), whereas in other countries archaeology is its own field of study. Either way anthropology and archaeology are linked through their investigation of human life and culture, but it is in their approaches that they differ. Archaeologists use material culture (artifacts) and biological remains (human and non-human bones, seeds, pollen) found at archaeological sites to draw conclusions about culture and society in the past, whereas anthropologists often draw on knowledge from present cultures and ideas to say something about humans (Renfrew & Bahn, 2020, p. 12; Jurmain, Kilgore, Trevathan, Ciochon & Bartelink, 2018, pp. 10-12).

Physical anthropology is a sub-discipline of anthropology that focuses on "the study of human biology within the framework of evolution with an emphasis on the interaction between biology and culture" (Jurmain et al., 2018, p. 12). It is a discipline that has its roots in medical and anatomical studies starting already in the Middle Ages, specifically in Italy where human dissection was allowed, something that was still taboo in many other countries. Simon Mays (2023) describes osteoarchaeology as the study of human remains from archaeological contexts. Osteoarchaeology uses methods and theories developed by physical anthropologists but has a focus on archaeological sites and contexts. Sellevold (2014) describes osteoarchaeologists as also being interested in what the bones can tell us about the circumstances 'around' them, rather than focusing on morphological studies as physical anthropologists had previously. She also states that "osteoarchaeology is a truly interdisciplinary science, dependent on both natural sciences and humanistic sciences to achieve its objectives (p. 23).

2.3.2 Osteoarchaeological analysis and methodologies

A discipline such as osteoarchaeology is constantly developing, and so are the methodologies used within it. As mentioned previously, osteoarchaeology is very interdisciplinary and uses methods linked to both the natural sciences and the humanities in order to gain all sorts of different information (Sellevold, 2014, pp. 23-27). Methods include dating methods, methods to establish a biological profile (biological sex estimations, age at death estimations, stature estimations, pathology estimations), methods to establish cause of death, diet, nutrition, and living conditions (Sellevold, 2014, pp.23-24). One of the more commonly known methods of dating is radiological dating, also known as ^{14}C dating (Carbon 14 dating). Stable isotope analysis on both carbon and nitrogen found in the collagen of the bone can be used to gain an insight into an individual's diet (Sellevold, 2014, p. 24).

Most of the methods that are used today, at least, in Norway, were developed some time after the 1960s, and are documented in *Standards for Data Collection from Human Skeletal Remains* edited by Jane Buikstra and Douglas Ubelaker and published in 1994. It is important to note that this publication is based on older methods though most of them from the 19970s and 1980s. This work concerns non-destructive methods of analysis that can be used to establish a biological profile. Not only does the work present these methods, but it also presents guidelines for photographing, taking inventory, measuring skeletal remains, and thoroughly documenting the remains.

The accuracy and precision of estimate age-at-death, biological sex, and stature depend on many factors, such as what age category is being analysed (juveniles or adults), what skeletal elements are available, the sample composition, what methods are used, and research context (White & Folkens, 2000). Prior to the publishing of Phenice's 1969 paper *"A Newly Developed Visual Method of Sexing the Os Pubis"* accuracy and precision often depended on the experience of the osteologist doing the analysis. However, Phenice's new method has an accuracy of between 96 and 100%, though it may be slightly less accurate in older individuals (White & Folkens, 2000).

2.3.3 The history of physical anthropology and osteoarchaeology in Norway

The beginning of the 1800s saw a shift, particularly in western Europe, from religion to science (Kyllingstad, 2004, p. 14). The scientific

community became evermore important to society, and rather than seeking answers about the world from religion, scientific research became the more popular method of interpreting the world. In Norway, the first lecture on anatomy and physiology (for doctors and anthropologists) was held in January of 1815 by Professor Michael Skjeldrup at the university in Christiania[2] (Holck, 1990, p. 11). The aim of developing physical anthropology in Norway was to gain a better understanding of the national identity of the population as the National romance era emerged. As the discipline developed in Norway it would always be linked to the Anatomical Institute at the university in Christiania/Oslo and it was being mostly practised by anatomists and other academics of the medical field (Sellevold, 2014, p. 18). Like most other academic disciplines, relevant questions within physical anthropology have changed over time along with the changing contemporary focuses and interests (Holck, 1990). The 1800s also saw a focus on craniology and by 1853 even the Anatomical Institute had a small collection of skulls whereof most had been collected privately. However, in 1951 the collection got its first archaeological additions: two skulls from an excavation were added. As Holck (1990) writes in his book, it was under Joachim Andreas Voss that the Anatomical Institute started putting more effort into anthropology and it was taken more seriously. More skulls were added to the collection and Voss travelled abroad several times during his time as the head of the institute to learn from anthropologists in other countries. Kristian Emil Schreiner is one of the most well-known anatomists in Norway, and The Schreiner Collection at the Anatomical Institute was named after him. It was under Schreiner's leadership that anthropology became the institute's speciality, and bones from historical and archaeological contexts became a focus rather than the previous focus on measurements of the population (Holck, 1990, p. 60).

"The Schreiner Era" named not only after Kristian Emil Schreiner but also after his wife Alette (one of the first women in Norway to study medicine), lasted for the first half of the 1900s. Schreiner was involved in the excavation of human remains in Northern Norway as he developed an interest in Saami remains and human remains from the Stone Age. Schreiner was not the only academic to find the study of the Saami fascinating, and it became a larger part of Norwegian contemporary academia. Also foreign academics like Paul Broca and

[2] Modern day Oslo

Rudolf Virchow dedicated considerable time to studying the minority group (Holck, 1990, p. 66). Schreiner and his contemporaries' excavation of human remains, and especially the remains of Saami individuals, received a significant amount of opposition. There were many who thought the dead should be allowed to rest in peace, and especially during the 1920s and '30s many newspaper articles were published criticizing the excavation and study of these human remains.

While her husband focused on Northern Norway's populations of the past, Alette Schreiner continued the mapping work her husband had previously started on collecting measurements and other physical information of the present population (Holck, 1990, p. 69). It was around this time that the Institute started taking on an advisory role as well as an educational and administrative role. This advisory role was mainly aimed towards the archaeological disciplines, especially in relation to the excavations being done in relation to city planning and construction. In the 1920s in Oslo a lot of the medieval material under *Gamlebyen* (lit. The Old City) was excavated. Unfortunately, due to the excavation and documentation methods most of the postcranial material was simply put in boxes and labelled with the place and year of excavation, whereas the crania were given individual numbers prior to adding them to the collections of the Anatomical Institute (Holck, 1990, p. 71). Schreiner published the *Crania Norvegica I/II* between 1939 and 1946, and it was in this work that he documented cranium measurements from the Stone Age all the way up to the present. Much of the Middle Age material uncovered in Oslo and some other cities was used for this publication.

In the interwar years, the institute conducted their own excavations, primarily on Sami burials (Emil Schreiners main interest), with the result that over 500 skulls were added to the catalogue (Schreiner, 1931-1935). During the Second World War, in 1941, Schreiner was accused of and arrested for "conducting activities hostile to the state"[3] (Holck, 1990, p. 73). He went back to his work in 1943 and retired in 1945. Holck (1990) also states that Nazi inspired race research never took hold in Norway, as there was no space in Norwegian academia for this to grow. However, it has been documented that both Schreiner and Halfdan Bryn who believed they were part of a superior race compared to the Sámi people, though this was very much an attitude that was common at the time and drove a

[3] Translated by author, "statsfiendtlig virksomhet"

lot of the research on the Sámi population. Even though this type of research never gained traction in Norwegian academia, there were academics such as Halfdan Bryn who moved to Germany in the interwar period in order to write his books amongst colleagues who agreed with his view on the Germanic race and its superiority (Kyllingstad, 2012). Though he was retired, Schreiner was not quite done with physical anthropology. In post-war Norway questions of ownership of skeletal remains once again became relevant. In 1899, a law ("*Lov om Afgivelse af Lig til Brug for Universiteters medicinske Undervisning"*) had been passed that basically gave the Anatomical Institute the scientific and administrative responsibility for any individual that had been buried as long as there were no living relatives that could claim the remains for repatriation, and Schreiner was of the opinion that this included the historical remains. There was, however, opposition to this view, as Anton Wilhelm Brøgger (an archaeologist) believed that all of the osteological material should be the scientific and administrative responsibility of the archaeological museums. They had previously had arguments concerning this, and Schreiner championed his view until 1946. This is also the year he published *Crania Norvegica II* and with that he fully retired from anthropology.

After the retirement of Schreiner, the new head of the Anatomical Institute, Johan Torgersen, continued the anthropological work after Schreiner; however, he brought the field into a new phase that saw a focus on genetics and evolution. Much like Schreiner in his time, Torgersen also did analyses and gave advice regarding skeletal remains from archaeological excavations from several of the museums around the country (Holck, 1990, pp. 76-77). Torgersen was also the one who inspired Bernhard Getz to pursue physical anthropology. Getz was the one who corresponded with Sverre Marstrander on behalf of the Anatomical Institute, and it was in all likelihood Getz who performed the osteological analysis of the skeletal remains from Jøa. Following the 150-year jubilee of the University of Oslo in 1961, the Anatomical institute had to expand their physical space in order to have room for all of the skeletal remains that were being excavated at archaeological sites around the country. As Torgersen neared the end of his career he struggled to find someone to take over the anthropological studies at the Institute; however, he was able to memorialize Schreiner through the naming of the anthropological collection at the Anatomical Institute to *De Schreinerske Samlinger* ("The Schreiner Collections").

After Torgersen's sudden passing in 1978, there was no one to continue the anthropological work, even though there were still incoming requests asking for advice and analysis on human remains. Ludvig K. Haugen took over temporarily. As archaeologists found themselves without anyone to turn to for the necessary aid, an agreement was made between the Anatomical Institute and *Den arkeologiske interimskommisjon* (The Archaeological Interim Commission, DAIK), which in 1982 hired Per Holck in a part time position to maintain the collection and work with the incoming material. DAIK was established in order to discuss challenges that were common to the five archaeological museums and *Riksantikvaren* (The Directorate for Cultural Heritage), in order to find solutions (Brendalsmo, 2004, p. 38). Since the late 1900s there has once again been a focus on the study of skeletal remains - both human and animal - which also brought with it new specializations and terminology, like osteology, human osteology, osteoarchaeology and historical anatomy/osteology (Holck, 1990, p. 12).

Sellevold (2014, pp.22-23), describes the time period from 1994 to the present day as 'The osteoarchaeological period', as a full time osteoarchaeology position was opened at NIKU (Norwegian Institute for Cultural Heritage Research). This position was one of the first in Norway, and when this position opened there were still few people with osteological expertise in Norway. It took a few more years before the archaeological institutions in Norway had people with osteological expertise, but even today there are few with such expertise. It is also in the late 90s that the term 'osteoarchaeology' starts being used more than 'physical anthropology'.

2.3.4 The present standards and laws for excavating and conducting research on human remains in Norway

In Norway there are no standard methods that are used during osteological analysis. There are few standards in general regarding the excavation, treatment and documentation of human remains. As Sellevold (2011) explains, the methods that are used in Norway, are methods that have been internationally recognized, for example, Buikstra and Ubelaker (1994) or Trotter and Gleser (1958).

There is little literature regarding the excavation and treatment of human remains in Norway, primarily due to a non-existent professional community within osteoarchaeology; however, Berit

Sellevold has written a chapter in *The Routledge Handbook of Archaeological Human Remains and Legislation* about Norway, which is probably the most comprehensive work that exists regarding this topic. The Burial Act was enacted the 7th of June 1996, and concerns churchyards, cremations, and burials (Sellevold, 2011). The Burial Act protects graves for 20 years and graveyards no longer in use for 40 years. The act also protects natural graves, remains found in the sea or out in nature. Graves of foreign soldiers and prisoners of war from World War I and World War II are protected without any time restrictions (National Research Ethics Committee, 2018). Human remains and their associated graves and burials from the Middle Ages and earlier time periods are protected by the Cultural Heritage Act (Sellevold, 2011). The Cultural Heritage act automatically protects archaeological finds from prior to 1537 AD, meaning burials from after 1537 AD that are older than 40 years are not protected by the cultural Heritage Act or the Burial Act. Sámi material that is from prior to 1917 AD and ship finds that re more than 100 years old are also protected. If a burial is from after 1537 AD they can be protected through an individual protection order (National Research Ethics Committee, 2018). The treatment of human remains that are discovered depend on their status according to the law. Sellevold (2011) explains that finds that are not legally protected do not have to be documented, excavated, or stored. They may be treated the same way as legally protected finds, but it is not a requirement. In 2009, Sellevold authored a report for NIKU suggesting some guidelines for how to excavate and treat remains that are from newer periods and not protected according to the law. The government is currently attempting to establish guidelines for the unprotected remains (Sellevold, 2011). This work is from 2011 meaning it reflects the standards, laws, and guidelines at the time. However, during a workshop arranged by the Skeletal Remains Committee (*Skjelettutvalget*) in 2021 it became clear that not much has changed since then. There has been some effort to revise the Cultural Heritage Act in order to protect remains from after 1537 AD, but the lack of a professional community in osteoarchaeology has made this process difficult (personal communication with Nina Elisabeth Valstrand, 12.05.2023).

For human remains that are protected by the law, Sellevold (2011) highlights that these remains must be excavated by an archaeologist (only archaeologist are authorized to excavate human

remains), and there must be a plan that maps excavation, documentation and the collection of the human remains. Once they have been excavated an archaeological museum will be responsible for the curation of the remains. It is not a requirement to have a physical anthropologist or osteoarchaeologist as part of the excavation, even though they are specifically trained and educated in how to excavate and analyse human remains, and also have knowledge of important scientific information that should be documented during excavation. In recent years, it has become more common to have osteoarchaeologists as part of larger projects, especially those that concern the excavation of churchyards (Sellevold, 2011). Once the remains have been excavated, they are brought to the archaeological museum that is in charge of the area where the remains were found. There is not requirement for an analysis to be done on the remains, they may simply be taken into the catalogue and no further work done to them (Sellevold, 2011).

There are, of course, ethical considerations that must be considered. In Norway, in particular, Sámi human remains are especially protected. The Sámi suffered many injustices by Norwegian authorities and the ethnic majority population, including the plundering, excavation and removal of Sámi human remains and bringing them to the institute in Oslo. Some of the human remains were even of known individuals, something that we today also consider to be unethical (Sellevold, 2011). Sámi remains are today protected, by law. If Sámi remains are to be part of any research, the researcher must send in an application to the National commission for Research Ethics on Human Remains (*Skjelettutvalget*, referred to in this thesis as the Skeletal Remains committee), as well as the Sámi parliament (Sellevolld, 2011; National Research Ethics Committee, 2022).

The Skeletal Remains Committee is an important advisory body which is part of the National Research Ethics Committee. The Skeletal Remains Committee was established in 2008, in response to the debate surrounding research on the Sámi remains that were part of the Schreiner Collection (Sellevold, 2011; National Research Ethics Committee, 2020). The committee has two members who represent the lay population, as well as eight members who have different professional backgrounds. These members are appointed by three other committees (The National Committee for Research Ethics in Science and Technology, The National Committee for Medical and

Health Research Ethics, and The National Committee for Research Ethics in the Social sciences and the Humanities). The main aim of the committee is to "[evaluate] the ethical aspects of research where the source material consists of human remains which are in public museum and collections, or which will be found in future archaeological and other surveys" (National Research Ethics Committee, 2020). As Sellevold (2011) states, the committee takes into account the Cultural Heritage Act, the Burial Act, and international conventions that have been endorsed by Norway (e.g. the Malta Convention: The Convention on the Protection of the Archaeological Heritage of Europe and ICOM's Code of Ethics). Finally the Skeletal Remains Committee also publish their own guidelines, that researchers can choose to follow (National Research Ethics Committee, 2020). The committee has published two guides, one that highlights what should be done when human remains are discovered, and one that highlights what to consider when doing research on human remains. Both guides obviously focus on ethics, and the appropriate laws that must be followed in regard to what remains are protected by the law and which are not.

Chapter 3: Theoretical Background

This chapter will outline some of the relevant theoretical ideas, mostly drawing on gender theory and feminist theory and their role within archaeology. The first section will give an overview of the historiography of gender studies in archaeology. The influence that feminist theory has had on gender theory in archaeology, and how it has changed over time. Following this will be a section that highlights the relevant theories and ideas and how they will be applied to this thesis.

3.1 The Study of Gender and Gender Theory in Archaeology

Like in many other disciplines, gender was not an aspect that was studied until well into the 1900s, and it was the marginalized female voice within the academic field in the 70s and 80s that started looking into the women of the past and how they had been ignored or lumped together by male academics. This is where we find the beginnings of gender theory in archaeology. With the first wave of feminism, women in archaeology spearheaded the shift in the discipline, and it was Suzanne Spencer-Wood that held the first session on gender at an archaeological meeting in 1986 (Nelson, 2013, p. 128). In terms of published academic material, "the first substantive contributions to a feminist archaeology were published both in the United States and Norway" in the 1980s (Engelstad, 2007, p. 217). The problem up until this point had been that archaeologists were failing to consider historical variations and cultural diversities in gender relations (Gilchrist, 1999, p. 4). As Weglian (2001) highlights, archaeologists were just using 'common sense' to interpret evidence. Archaeologists were analysing past cultures and communities with modern and Western ideas about gender. The preconceived categorisations of 'male' and 'female' make it problematic and difficult to attempt to understand sex and gender outside our own culture (Pearson, 2003, p. 95). Linda Hurcombe (1995) shows this when she highlights her students' reaction to her statement that women were more likely to be gatherers than hunters. Students commented that this notion was sexist; however this misses the point of sexual dimorphism and evolution, and simply highlights our own biases and cultural experiences in relation to activities and their status. "The female students wanted women to be seen as hunters because this was the task *they* valued more" (p. 96). This is an issue not only in relation to

gender in archaeology, but many other aspects where personal interest and bias influence academic research and work. This influence may not always be intentional, but it is always there, and it is incredibly difficult to be entirely objective (Conkey & Spector, 1984; Wylie, 1997)).

However, it is not only modern gender ideas that influence how gender is analysed. As Stratton (2016) highlights in her work, the binary results of male or female that come from osteological analysis of skeletal remains further informs the analysis of a burial, meaning the binary idea of gender often permeates the research. She also states that "an understanding of gender based on sex ignores non-Western concepts of gender in which there may be more than two genders, where individuals may transcend gender categories, or where gender can be fluid and changing" (p. 855). Moen (2019b) also highlights that the binary either/or categorisations are the basis for many of the models used and followed in archaeology, meaning there is a deep and underlying thought process that must be shifted. Sofaer (2006) states in her work, one of the main problems that arises from linking material culture to categories of bodies, is the superimposition of gender onto biological sex. This poses a problem as gender and biological sex are distinct and not necessarily built off of one another.

What is interesting is that we have modern day examples of cultures that do not operate with a binary male or female gender association. The Hua (an indigenous population of Papua New Guinea), for example, give the name of a recently deceased person to a new-born and that newborn is then considered to be in possession of much of the wisdom and gender aspects of the original owner of the name. The more a name has been passed down the more identities a person can encapsulate, highlighting that gender is not something unchanging, but rather something variable that rests on a sliding scale (Pearson, 2003). We also have examples from Inuit populations where a son may be referred to as 'aunt' or 'stepmother' as the relationship to the guardian of the child's soul is more important than the sex or gender of the child (Crass, 2001). The Inuit language also has no gender specific pronouns, and activities are not gendered either. As Crass (2001) explains further, clothes can differ between the sexes; however, this usually relates to the sex of the person you were named after rather than the sex of the person themselves. Shamans are traditionally seen as androgynous and tend to wear clothes that feature elements of both male and female clothing (Crass, 2001).

There are three current key issues as presented by Moen (2019b, pp. 207-208) with the aspect of gender in archaeology:

1. Ongoing marginalization of gender as a sub-discipline
2. Implicit and unconscious bias of presentism and assuming universality of gender constructions
3. Potential to find a better way of studying the past using approaches informed by intersectional perspectives

The existence of an *archaeology of gender* is proof that gender is still an aspect that is often marginal in archaeological enquiries (Moen, 2019b, p. 207). There are academics that argue that rather than having a sub-discipline focusing on gender in archaeology, it should be integrated into all research. Gender should always - along with other aspects - be part of the question when considering the lives of those in the past. The reason it is highlighted that gender must be considered **along with other aspects** is because the intersection of these is what makes a person who they are. As Jenkins (1996) states, "put simply, identity refers to the ways in which individuals and collectives are distinguished in their social relations with other individuals and collectives." (p. 4). These interactions and relationships are affected by gender, ethnicity, sexuality etc. (Meskell, 2002), specifically the interaction between these aspects of an individual. Intersectionality plays a huge part in gender theory today. Gender is not the only aspect that influences identity and its formation, meaning we do not get a whole picture of an individual if we neglect other aspects such as status, class, disability, and religion, amongst many other things (Lund & Moen, 2019).

As we can see from the historiography, when academics talk about the importance of studying gender in archaeology, one of two things is usually meant; the first being that gender should be looked at without the preconceived binary ideas and the link to biological sex, and the other being that women need to be studied more thoroughly as the research on women has been historically very limited and not to a very high standard. However, in order to have a constructive discussion about gender, archaeologists must be able to "excavate [their] own preconceptions and [unacknowledged] assumptions'' (Pearson, 2003, p. 96). Pearson (2003) further highlights that this is the clearest when assigning meaning to grave goods. Conkey and Spector (1984, p. 11) criticize Howard Winters for this exact issue, highlighting his double-standards in relation to finding trade goods in male and female burials. In the male burials the trade goods are

described as indicating that the man engaged in trading; however, when the same trade goods were found in female burials it was stated that these must have been gifts from a man.

3.1.1 Sex vs Gender

Sex is most commonly understood through biology, and the term is used to highlight the "fixity of unchangeable biological characteristics" (Sofaer, 2006, p. 90). While sex has been defined as natural, gender is most commonly understood as a social construct that is influenced by culture and is therefore changeable (Gilchrist, 1999; Butler, 1990; Skogstrand, 2014). In her work, Butler (1990) presents arguments that sex is also socially constructed. Feminists such as Simone de Beauvoir and Monique Wittig, both directly or indirectly, argue that gender and sex are not linked, and that the term and idea of 'sex' in itself is gendered and constructed (Butler, 1990). Wittig also highlights that it is important to understand the power that language holds over ideas and systems (Wittig, 1985). Due to a fear of biological determinism, post-structuralist theorists have attempted to abandon the term 'sex' in order to escape suppressive structures and sexism (Moi, 1999, p. 42). However, Moi (1999), argues that it is not necessary to abandon the term 'sex' to avoid biological determinism. By acknowledging that "biological facts [do not] justify social values" we can achieve the same thing (Moi, 1999, p. 43). If sex is also a socially constructed category, then there would be no reason to see gender as the cultural interpretation of sex. As Skogstrand (2014, p. 19) states in her work, sex as a categorisation is there to make it possible to investigate reality, rather than to describe reality. This viewpoint is important to osteoarchaeology as the categories 'male' and 'female' should be seen as tools in a methodology and analysis rather than a reality of prehistoric contexts. As long as this point is acknowledged in the conclusions drawn based on osteoarchaeological analysis then the term 'sex' and the categorisations of 'female' and 'male' are still important. As Sofaer (2006) states,

> It is '… possible to acknowledge that the particular notion of sex as it is understood in osteoarchaeology is the product of a particular contextual and historical perspective […], without suggesting that observable differences between men and women are some sort of irrelevant mirage… (p. 96)

The information that is acquired through osteological analysis is useful in its own right, as long as we acknowledge the limitations, and are

careful not to equate sex with gender. Though it can be said that the morphological differences between males and females exist along a spectrum, individuals are not evenly distributed along this spectrum and are primarily found within two groups of similar elements (Skogstrand, 2014). Butler (1990) argues that if sex and gender are distinct then the gender categories of 'woman' and 'man' do not necessarily have to be culturally constructed from female or male bodies, respectively. This would also mean that gender would not be restricted to jus the two categories 'woman' and 'man', but rather a number of different genders, as gender is not limited by the binary categories 'male' and 'female' that are associated with sex (Butler, 1990).

3.1.2 Relevance to this Thesis and Application

Essentially, this thesis considers whether biological sex coincides with the presumed cultural sex (in this case the cultural sex is based on grave goods). This will have implications for the final discussion where we must consider whether grave goods accurately represent cultural sex, and how this affects what methodologies we can use to determine aspects such as biological sex and cultural sex. This means that biological sex, social sex, gender, are all terms that will be used throughout the discussion and the results. When referring to the results from the osteological analysis the term biological sex will be used. The term social sex will be used throughout the rest of the thesis, in an attempt to create some distance to our modern understanding of gender.

The distinction and difference between sex and gender will be especially important in the further discussion of the results in later chapters. When analysing skeletal remains it is important to treat each skeleton as an individual. This means considering the grave goods, the estimated biological sex, and potential gender discussion individually for each skeleton. When working with individuals we have to be careful about generalizing and being aware of the limitations if we do make generalizations. It is also important to remember that though the 'male' and 'female' categories are useful analytical concepts, they are not objective accounts of sex in the past. In the analysis biological and social sex will be treated as distinct yet connected in some ways.

It is also important for me, as a researcher, to understand and state that I as white, middle class, woman will have some biases that come into play in this thesis in ways that I am unable to see and

negate. Through the research that I have done, I have tried my best to come at this from as neutral a perspective as I can.

Chapter 4: The Human Remains

4.1 Introduction to the skeletal remains

After their excavation in the 1960s and their subsequent deposition in *De Schreinerske Samlinger* (The Schreiner Collection), the skeletal remains from Jøa were stored at Anatomisk Institutt (The Anatomical Institute) in Oslo until the autumn of 2022. In the autumn of 2022, the remains that were originally found within the area that Vitenskapsmuseet were responsible for, were brought back to Trondheim to be curated at the NTNU University Museum. All related documents were made available, and Vitenskapsmuseet now had the task of adding all of the skeletal remains to their collections. The remains from the sitting burials on Jøa were made available for analysis for this thesis almost immediately after their arrival in Trondheim. In general the bones were in relatively good condition and well-preserved. All the bones had scuff marks from being buried in shell sand.

There were 14 A-numbers, which were the numbers provided by the Schreiner Collection. We assumed there were 14 individuals, one for each A-number; however this was not the case. Several inconsistencies were revealed during the analysis of the skeletal remains, which made it increasingly difficult to correlate the skeletal remains with the information from the excavation report and the information from the Schreiner Collection. As previously mentioned the sitting burials on Jøa are unique in both the style of burial custom and the number of burials in one place, and it is therefore problematic that so many challenges are now associated with the remains, making them difficult to analyse and learn from. In order to use these skeletal remains for the analysis, all of the challenges encountered must be presented and evaluated, as these have significant impact on the results, therefore this chapter will present all the individuals and the associated challenges encountered. Due to the sheer number of challenges faced after concluding the analysis, a lot of time was spent working through these challenges in order to complete the analysis and the thesis. It will also present and evaluate the sources that all this information is based on.

4.2 A quick-view of the individuals (by A-number)

Below, each A-number and the individual(s) associated will be presented along with encountered issues in connection to them, in an effort to make it easier to refer back to this during the later discussion of the results.

A-number	T-number	Grave	Elements missing	Challenges
A4991	T28746	Grave I - IV	-	Bones recovered from several graves prior to archaeologist arriving, but the elements appear to add up to only one individual.
A4992	T28747	Grave II	several ribs	See A4994
A4993	T18646	Grave V	-	-
A4994	T18645:002	Grave II + III	-	Skull form Grave II (A4992) is estimated as ?M, but both individuals in the mixed material were estimated F.
A4995	T28748	Grave IX	-	-
A4995b + A7439	T18648:d/004 + T18648:c/003	Grave VII	Right + left foot, pelvis	Partially excavated in 1963, but finished in 1965, therefore there are two A-numbers for the same individual.
A7440	T18649:011	Grave X	Pelvis, one femur,	-

A-number	T-number	Grave	Elements missing	Challenges
			right foot, ribs, right arm	
A7441	T18650:2	Grave XI	Pelvis	There were two A-numbers that had individuals apparently belonging to Grave XI: A7441 and A7446. In one of the newer sources, A7446 is listed as Grave XIb; however, this is not mentioned anywhere else, especially not in the original report. According to the original excavation report, there is only meant to be one individual.
A7442	T18651:b/002	Grave XIII	Cranium, vertebrae, finger bone, part of femora, part of pelvis	-
A7443	T18752:k/020	Grave XIV	Pelvis, ribs, and sacrum	Two individuals (two mandibles) under this A-number, although there should only be one.

A-number	T-number	Grave	Elements missing	Challenges
A7444	T18653:c/004	Grave XV	Parts of tibia, part of foot, ribs	-
A7445	T18654:003	Grave XVI	-	-
A7446	-	Grave XI(b)	Pelvis	See A7441
-	-	Grave IV	-	This entire skeleton is missing.
-	T18647	Grave VI	-	This entire skeleton is missing.

Table 2: The challenges associated with each A-number and grave.

4.3 The challenges

When the box marked with A4991 (T28746) was opened it seemed like only one skeleton was in the box, and it was treated as such. After reviewing the original report written by Sverre Marstrander it became clear that this were skeletal remains collected prior to Marstrander showing up (Marstrander, 1968); therefore, it could belong to Grave I, II, III, or IV. In the report it is assumed that because there were separate remains from Grave II and III, that the remains that now had no context all belonged to Grave I; however, we cannot be certain of this.

We encounter a major issue with the skeleton from grave IV and grave VI (T18647) which both do not seem to be among the remains currently present in the collection. According to the drawings and the descriptions in the report, grave VI contained several skeletal elements, including the mandible and pelvis. There were no estimates of biological sex, age, or stature in the 1968 report, even though the elements necessary to perform an analysis were present according to the report. Neither Grave IV or VI are mentioned in the letters between Marstrander and the Anatomical Institute. Grave VI was given a T-number as there were grave goods found in the grave, listed as an iron brooch, fragments of a pair of iron scissors, and two knives in the 1968 report. These items do not match with what is listed in the collections catalogue of Vitenskapsmuseet. Under T18647 there is a knife,

scissors, a belt buckle, and a finger ring. These listings include photographs taken in relation to the revision of the magazine, which started around the year 2000. In the report grave IV is described as containing a cranium, spine, ribs and some long bones from the lower body and arm, and a scapula, and the drawing corroborates this description. The report also describes the bones as being incredibly fragile, and it is therefore possible that we have simply lost the elements over the years due to poor conservation or preservation. There is a possibility that these two missing individuals have been comingled together with other individuals that are present, as there are two A-numbers with one-to-many individuals.

For each of the graves there is a description in the excavation report of what elements were present within the grave. After comparing these descriptions, the drawings and the actual material which was analysed we see that there are inconsistencies. There are several elements that are described in the report as being present; however, during the analysis for this thesis these elements were not present. Most significantly there are several graves (Grave VII, grave X, grave XI, grave XIII, grave XIV) where the pelvis or at least part of the pelvis should have been present, but they are not. Grave XIII is also missing a well-preserved cranium, which should be present according to the report. We would expect more pelvises to be present than we found, due to the fact that there are many femora and sacra that are present and also well-preserved. Thus it makes no sense for these pelvic bones to be missing. This would suggest a deliberate removal of these elements at some point after the 1968 excavation and must have occurred before the skeletal remains were returned to Vitenskapsmuseet in 2022.

Similarly, from the box labelled A4991 (T28746) there were only three vertebrae, which in itself is not extraordinary, but what is odd is that there is one cervical, one thoracic and one lumbar vertebra. This is unlikely to have occurred naturally and would again indicate some form of deliberate choice of what to keep. The original report also does not mention any pelvic bones specifically in the skeletal inventory from Grave II or for the comingled remains between Grave II and III; however, two pelvic bones were found in the box with the skeletal inventory from Grave II and III. In the excavation report and in the letters from Getz (1966) the sexing of the skeletons was done based on the skull from Grave II and the size of the bones in the mixed material.

The box with remains from grave XIV (T18652, A7443) contained two mandibles, and there is no indication in the original report that there was more than one individual in the grave. The rest of the elements in the box also indicate that there is only one individual; however it is problematic to evaluate which elements belong together with which mandible, making most of the information gleaned from this grave questionable at best, and therefore unusable for further analysis.

Grave VII was partially dug in 1963; however, they were unable to finish excavating this grave, and therefore finished it two years later in 1965. It is most likely therefore that there were two boxes with different A-numbers that contained parts of the same individual. A4995b and A7439 are both related to T18648 and grave VII. A4995b contains a partial cranium, and the head of a single rib. A7439 contains an ulna, a radius, and a humerus. These are not all the elements listed as having been in grave VII, meaning at least a right and left foot, and a pelvic bone were not present though described in the report. It is important to note here that A4995 and A4995b are A-numbers referring to different individuals.

Grave XI (T18650), also has two related A-numbers. Within the boxes for A7441 and A7446 were papers indicating that they belonged to grave XI. In an excel document received from DSS (personal communication with Julia Kristine Kotthaus, 05.09.2022) it is stated that A7441 is grave XI and A7446 is grave XIb. There are no references to XIb in any other literature. In the description of the grave within the excavation report, there is no mention of any specific elements being present, just that the individual was buried in a sitting position and that the upper body had fallen forward due to taphonomic processes, and the spine was broken. There is mention of a left pelvic bone which is not present. In the drawing of grave XI, almost all elements seem to be present. The drawings indicate a cranium, mandible, hands, feet, most of the long bones in the arms, several of the long bones in the legs, pelvic bones, some vertebrae, and some ribs. The problem is that in the box labelled A7441 were four lumbar and one cervical vertebrae, and the box labelled A7446 contained 3 thoracic and all the vertebrae from T10 to L5. This would indicate that they are two separate individuals and not the same individual.

4.4 A quick view of the sources

Below all of the main sources used to gather information about the skeletal remains are listed in a table. Other sources used regarding the burials on Jøa (see Mokkelbost, 2007) are all based on most of the sources listed below.

Title	Author	Publishing/archiving year	Notes
Letters between Marstrander and Anatomical Institute	Sverre Marstrander + Bernhard Getz	1963	Letters that mostly concern the skeletal remains and the age, biological sex, and stature estimations. These are estimates used in the original excavation report. There are only estimations here for some individuals, not all of them.
Excavation report	Sverre Marstrander	1968	Descriptions of the graves and the skeletal remains, including drawings. The estimations given in the report are based on estimations by the Anatomical Institute.
Pictures	-	-	Pictures from the excavations in

Title	Author	Publishing/archiving year	Notes
			1963, and '65-'66.
Årbok for Namdalen 1978	Sverre Marstrander	1978	An article describing the unique burial position, briefly describing the skeletal remains, and a look at the bronze brooches and their design for dating purposes.
Excel document with info about the skeletal remains	De Schreinerske Samlinger	2022	A document that collates all the information about the skeletal remains that DSS had at the time.

Table 3: The sources used to gain primary information about the excavation and the human remains.

4.5 The sources

Three primary sources were used to gather information about the excavation and the skeletal remains. The first source is the excavation report written by Sverre Marstrander in 1968. This is referred to as the original report throughout the thesis as it is the first document written about the excavations and the skeletal remains found at the site. It was finished and filed in the archives on the 31st of January 1968 (Top.Ark. number: 017327). This report contains a lot of information. It explains why the excavation was done and all the circumstances surrounding the first discovery of the human remains. It gives a description of each grave, although what information is given varies from grave to grave. Some of the descriptions include what position the individual was in when excavated, some include the age, biological sex, and stature estimations. These estimations were all made by the Anatomical Institute after the skeletal remains were sent to them by

Marstrander. All of the graves that had grave goods have a description of these, and all the skeletal elements found are described. The graves that had neither grave goods nor human remains are also described, with a focus on the dimensions of the graves. The next source is an article, also written by Sverre Marstrander, in the yearbook for Namdalen in 1978. This article has some information about the skeletal remains, but a larger part of the article is spent describing the grave goods, specifically the bronze brooches and their designs. In the article the designs on the brooches are used for the dating of the site. Marstrander also spends some time highlighting the "sitting" position some of the individuals were found in and why this burial technique is unique and significant in Norway. There is one difference between the 1968 report and the 1978 article. The skull found in Grave II was estimated as female, whilst some larger bones in the mixed material from Grave II and III were estimated as male. Based on the fact that the skull was found in grave II the Anatomical Institute estimated Grave II to be female and Grave III to be male. However, a bronze brooch was found in grave III, and it is based on this brooch that Marstrander in the 1978 article has Grave II as the male grave and Grave III as the female grave (Marstrander mentioned this in the original report as well but kept the estimations from the Anatomical Institute). The final source used in this thesis is an Excel document received from De Schreinerske Samlinger after contacting them with an application to study the remains from Jøa. The document itself was made in April 2022; however, this does not mean that the information was not collected and collated prior to this date.

4.6 Summary and decisions

All of these problems indicate that there has been a loss of skeletal elements, possible comingling of skeletal elements, and a loss of the connection between information and the skeletal element throughout the process of excavation, analysis, and curation of the skeletal remains from the sitting burials in Sandvika. In order for the material to be analysed for this thesis there are some things that must be decided at this point in the process, in order for a productive discussion to be possible.

In order for an individual to be included in the discussion, it must:

- Be present in the collection
- Not be comingled

- Have, at least, an estimation for biological sex

There may still be some uncertainties, but with the decisions made these uncertainties will have been minimized. It is also important to acknowledge that the discussion will concern not only the main aim and question of the thesis, but also the research questions that were developed. Some of the remains that may not meet the above criteria and so cannot be used to answer the main aim, can still be used to answer some of the research questions as the parameters vary.

Due to the issues regarding some A-numbers including two individuals and at least one grave (XI) that has two separate A-numbers, it is difficult to accurately know how many individuals there are overall. According to the original report there were 14 graves with human remains still preserved. After analysis there is a minimum of 14 individuals, although, as mentioned previously, there were no remains present for Grave VI and Grave IV but two individuals each in Grave XIV and in the mixed material from Grave II and III. For the prevalence calculations in the results section (Chapter 6) the minimum number of individuals (MNI) has been used. A decision would also have to be made regarding the differences in grave goods from the original report and what is found in the collections catalogue of the museum today for Grave VI (T18647); however, this skeleton is not present under its T-number or grave number meaning this inconsistency has no consequence for this particular study. What this *does* mean though, is that one of the graves that had grave goods available for comparison cannot be analysed in this study.

4.7 The Anatomical Institute, Time, and Context

What is apparent is that there is a long period of time between 1978, when Marstrander last wrote about the remains, and 2022 when the document by De Schreinerske Samlinger was made, and it is clear from all of the problems outlined above that many undocumented things have happened to the human remains while they were at the Anatomical Institute in Oslo. In 1984 Den Arkeologisk Interimskommisjon (DAIK, The Interim Archaeological Commission) had received several requests to look into the handling of osteological remains in Norway, and therefore they set up a small committee with three members to conduct this research and draft a report (Brendalsmo, Vibe Müller & Næss, 1984). Jan Brendalsmo (*Riksantikvaren*), Inger Helene Vibe Müller and Jenny-Rita Næss authored an extensive report outlining the problems that osteology in

Norway faces, and solutions to these problems. The report is over 100 pages long and incredibly detailed. It highlights two major problems, 1) loss of sources on site and 2) loss of sources at the Anatomical Institute. Both problems are partially linked to the fact that there, at the time, were no osteological experts in Norway, but both problems also indicate that a major problem was that there were no standards in Norway for the excavation and curation of human remains.

The first problem relates specifically to Riksantikvaren and NIKU who were responsible for the excavation of medieval towns and churches at the time, and encountered a lot of human remains. Due to the sheer number of burials they excavated a selection was made at every site of which certain individuals to excavate and keep for curation and potential further research. Furthermore, due to the lack of osteological experience and a lack of standards mentioned previously, the excavation and documentation was severely lacking.

The second problem highlighted is the loss of sources at the Anatomical Institute. One of the solutions put forward quite early on in the process was to hire someone to lead the Institute and take on the job of curating the human remains. Per Holck, who is a biological anthropologist (amongst other things), was hired on a part-time basis in 1982 to take on this task. Problems, however, still persisted due to a lack of resources, time, and once again, a lack of national standards for curation of human remains. It is most likely in this time when there were no standards, a lack of osteoarchaeological expertise, and a significant increase in the amount of human remains that were being collected each year, that many of the challenges noted in this chapter arose.

Another reason for all of these problems could be that the remains at the Anatomical Institute have not been curated by archaeologists. *Context* plays a vital role within archaeology, and it is only with context that we can properly analyse human remains and material culture. As it was highlighted in Chapter 2 (see 2.3.1), osteoarchaeology is the study of human remains from and within archaeological contexts. This also means that context has to be considered during the curation process. If someone who is not an archaeologist is to curate an archaeological collection, there have to be standards put in place that can be followed to allow vital contextual information to not be lost. Archaeological material and human remains are only useful to archaeologists if there is contextual information, and

if this information is not taken care of during curation, then a large amount of knowledge and potential for knowledge is lost.

Context is especially useful and important for human remains as each skeleton is an individual, which means that one skeleton cannot give us any generalized information about a population, unlike material culture. Demographic information is important, and all individuals need to be individually analysed in order to collect this demographic information and to draw conclusions about a group of people. Therefore each individual skeleton needs to be analysed, and each individual skeleton needs context.

Chapter 5: Methodology

5.1 The skeletal remains

Originally 24 graves were uncovered at the gravesite; however, only 14 of them had preserved human remains. When the remains were analysed in the 1960's at Anatomical Institute, only 11 out of the 14 graves had enough skeletal remains to estimate the biological sex of the skeleton. All of the methods chosen for this thesis are adapted from the book *Standards for Data Collection from Human Skeletal Remains* – by Buikstra and Ubelaker (1994) – except one of the ageing methods which was developed in 2015 by Falys and Prangle, involving scoring the sternal end of the clavicle. As part of the analysis, an inventory was taken of which elements of the skeleton were present in November 2022. The age and sex were estimated where possible, and measurements of the postcranial elements were taken.

Throughout this analysis any pathology or interesting points were noted. All of this information was noted on a digital excel form (adapted from a skeletal form originally by Dr Sean Denham (Arkeologisk Museum Stavanger), received through personal communication).

In some cases the excel form could not be used due to there being more than one individual present in the box, under the same T-number and A-number. In these cases, all the same information was noted in a word document. The skeletal elements that were used for age estimation, biological sex estimation, and elements with pathology were photographed along with a selection of other elements.

5.1.1 Ageing

Being able to estimate the age-at-death influences the biological sex determination. Sexual dimorphic traits do not become evident until an individual is an adult, which is why juveniles are not sexed. To estimate the biological age, four elements of the skeleton were analysed: the teeth, the auricular surface, the clavicle, and the pubic symphysis.

Tooth eruption and analysis of tooth wear is one method to assess age at death. Teeth erupt at specific ages and can therefore be used to, quite accurately, estimate age at death in juveniles. This method is most useful to assess the age of juveniles. The teeth can be used to assess the biological age of older individuals as well by looking at the wear on the teeth. The Brothwell (1981) classification charts allows for estimation of biological age within four age ranges (17-25, 25-35, 33-45, 45+). The tooth wear was also scored using Smith's

method, published in 1984, which highlights how tooth wear develops over time as the individual ages. This method is also presented in Buikstra and Ubelaker's standards from 1994, as can be seen in Figure 4. Tooth wear methods are often based on certain populations from certain time periods, meaning a specific type of diet. Therefore, these methods may not be entirely accurate to the individuals analysed in this thesis due to variations in diet and culture.

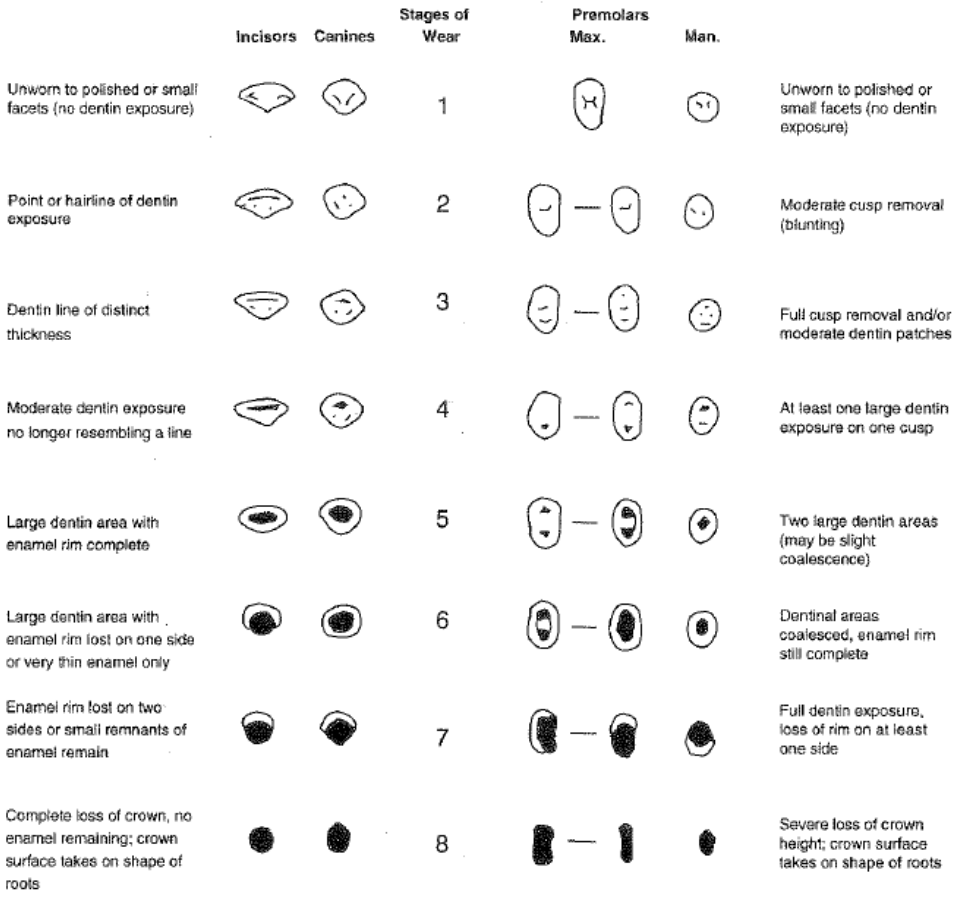

Figure 5: Surface wear scoring system for incisors, canines, and premolars. Drawings by Zbigniew Jastrzebski (as seen in Buikstra & Ubelaker, 1994).

If the teeth and epiphyseal fusion indicate that the skeletal remains are that of an adult, I used two further methods on two different areas of the pubic bone that can be used to estimate the

biological age. The auricular surface and the pubic symphysis both exhibit systematic wear that relates to the biological age of an individual. The auricular surface (part of the os coxae) is more challenging to analyse; however, it is more frequently preserved compared to the pubic symphysis and it is a well published and widely used method which should always be included when the auricular surface is preserved. In 1989, Meindl and Lovejoy, published a method whereby the auricular surface is scored based on specific descriptions of the changes in topography and porosity that occur over time due to wear, and this is what indicates the age at death of the individual.

The pubic symphysis is the area on the anterior side of the pelvis where the right and left sides articulate. It goes through age-related degeneration over time and is therefore a good indicator for age-at-death. For this thesis, the method published by Brooks and Suchey (1990) was used. This method involves looking at the pubic symphysis and comparing it to drawings (based on casts) of the pubic symphysis at distinct phases of degeneration. The reference images show the least and the most degeneration for each of the age categories. The reference images are different for male and female individuals, meaning the biological sex must be estimated first, before using this method.

Epiphyseal fusion can also be used to estimate age at death. Much like tooth eruption, the epiphyses of different bones will fuse at different ages. These ages are known and are quite similar between most humans (slight variation, by age, sex, and population), and most epiphyses fuse between the ages of 15 and 23 (Black, White & Folkens, 2012). The sternal epiphysis of the clavicle is one of the latest bones to fuse, usually in the early 20s. Using a method developed by Falys and Prangle (2015), which scores topography, porosity and osteophyte formation, the sternal end can be analysed, and an age can be estimated.

5.1.2 Sexing

To estimate the biological sex of the skeletons, traits on both the skull and the pelvis were analysed. Where the pelvis was available for sexing, more emphasis was put on the pelvic traits, as the differences between biological males and females are more distinct in the pelvis compared to the skull. This is due to the fact that the function of the pelvis is dramatically different in males and females in relation to locomotion and parturition which is also known as childbirth (White & Folkens, 2000, p. 366). The sciatic notch has a wider angle in females

due to the pubis being much wider in general in females to accommodate childbearing and childbirth (Black, White & Folkens, 2012).

Though there are differences between male and female skulls, the differences are not as obvious and distinct in all populations; therefore, the results from analysis of the pelvis are often deemed more accurate. There are various sexual dimorphic traits on the skull that were scored from 0 to 5. These are the nuchal crest, mastoid process, supra-orbital margin, supra-orbital ridge/glabella, the mental eminence, and the mandibular ramus. The mandibular ramus is not described in Buikstra and Ubelaker (1994); however, there is research (both within archaeology and forensics) that indicates that it can be used for biological sex estimation (see Loth & Henneberg, 1996; Taleb & Beshlawy, 2015). For this thesis, the gonial angle was assessed. The other traits were scored using a system developed by Acsadi and Nemeskeri (1970), where a 0 indicates that it was not possible to make an estimate, 1 means female, 2 means probable female, 3 means indeterminate, 4 means probable male, and 5 means male.

According to the method described by Phenice (1969) there are three elements of the subpubic region - the ventral arc, sub-pubic concavity and ischiopubic ramus ridge - that are scored from 0 to 3 (0 = not possible to make an estimate, 1 = female, 2 = indeterminate, 3 = male).

The greater sciatic notch is also scored from 0 to 5 with the same categories as with the cranial traits. The categories are accompanied by drawings, as can be seen in Figure 5 by P. Walker (as shown in Buikstra & Ubelaker, 1994). Finally, the preauricular sulcus is scored from 0 to 4 (0 = not possible to make an estimate, 1 = maximum expression, 4 = minimum expression) The preauricular sulcus is more commonly found in women, and there are some variations in the form, which can be seen in drawings (see Figure 6) by P. Walker (as shown in Buikstra & Ubelaker, 1994). All of the elements and scoring systems are listed below in Table 4.

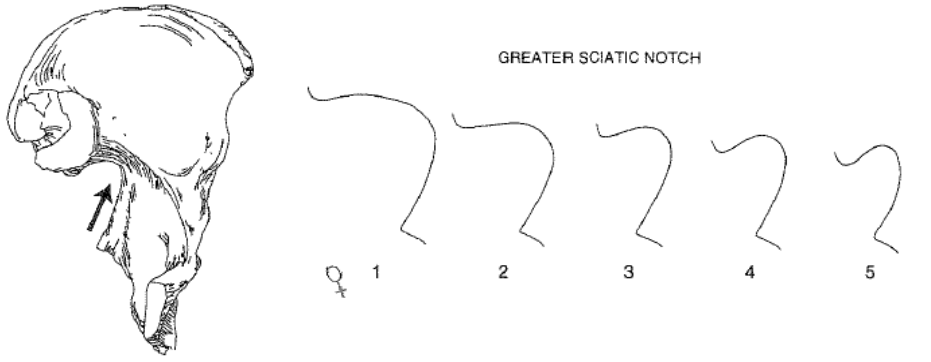

Figure 6: Drawings by P. Walker showing the differences in the greater sciatic notch (as seen in Buikstra & Ubelaker, 1994).

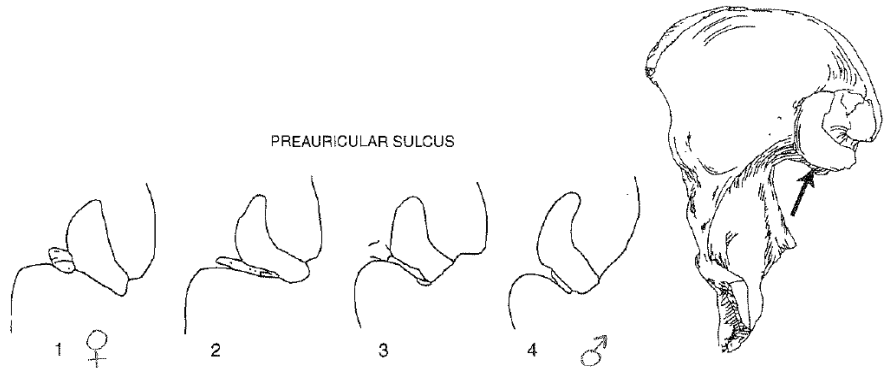

Figure 7: Drawings by P. Walker showing the differences in the preauricular sulcus (as seen in Buikstra & Ubelaker, 1994).

Skull	Scoring system
Nuchal crest	0-5 (Buikstra & Ubelaker, 1994)
Mastoid process	0-5 (Buikstra & Ubelaker, 1994)
Supra-orbital margin	0-5 (Buikstra & Ubelaker, 1994)
Supra-orbital ridge/glabella	0-5 (Buikstra & Ubelaker, 1994)
Mental eminence	0-5 (Buikstra & Ubelaker, 1994)
Mandibular ramus	0-5 (Acsadi & Nemeskeri, 1970)
Pelvis	-
Ventral arc	0-3 (Phenice, 1969)
Sub-pubic concavity	0-3 (Phenice, 1969)
Ischiopubic ridge	0-3 (Phenice, 1969)
Sciatic notch	0-5 (Buikstra & Ubelaker, 1994)
Preauricular sulcus	0-4 (Buikstra & Ubelaker, 1994)

Table 4: The traits on the skull and pelvis that will be scored as part of the biological sex estimation.

5.1.3 Stature

To estimate the stature of the individuals a mathematical approach was taken, due to the lack of complete skeletons. The mathematical method uses a formula based on population averages where only a single bone (usually the femur, or another long bone from the lower half of the body) needs to be measured and put into the formula to work out a range. These estimates do not take into account individual variations or proportions; however, it is the most accurate method when the entire skeleton is not available. The formulas established by Sjøvold in his paper *Estimation of Stature from Long Bones Utilizing the Line of*

Organic Correlation from 1990 were used for this thesis. In his research, Sjøvold states that sex has minimal impact on his equations.

Measurement	Number of samples	Total number of individuals	Estimation formula
Humerus 1	23	8577	4.74 Hum_1 + 15.26 ± 4.94
Radius 1	10	4625	4.03 *Rad*1 + 69.96 ± 4.98
Radius 1*b*	9	3492	4.67 $Rad1_b$ + 55.18 ± 5.49
Ulna 1	13	4994	4.65 Uln_1 + 47.96 ± 4.96
Femur 1	11	6706	2.63 Fem_1 + 49.96 ± 4.52
Femur 2	13	2308	3.10 Fem_2 + 28.82 ± 3.85
Tibia 1	9	3993	3.02 *Tib*1 + 58.94 ± 4.11
Tibia 1*b*	10	3643	5.10 $Tib1_b$ − 22.78 ± 4.69
Fibula 1	13	4190	3.78 Fib_1 + 30.15 ± 4.06

Figure 7: Stature estimation formulas using different long bones (as seen in Sjøvold, 1990, p. 442)

5.1.4 Pathology

To assess any pathology in bones a visual analysis of the elements was conducted, looking for abnormal bone growth or loss, which are two of the changes that occur in the skeleton in response to disease or trauma. Depending on the cause, these areas of abnormal growth or loss will look different, and so the cause can be evaluated. For example, a lack of vitamin C can lead to *cribra orbitalia* which manifests as small circular lesions in the roof of the eye sockets (Walker, Bathurst, Richman, Gjerdum & Andrushko, 2009; Brickley, 2018). However, minor trauma can cause the separation between the orbital bone and subperiosteum, causing bleeding in this area which can ALSO lead to *cribra orbitalia* (Walker et al., 2009). When considering pathology we can only determine a differential diagnosis, that is to say, finding all potential causes to the abnormal bone growth/loss. Potential causes are determined based on the actual pathology we can see on the bone, as well as context information like the geographical location, time period, age of the individual, etc.

5.2 Ethical considerations

When working with human remains there are always ethical considerations. In Norway, one of the more important ethical considerations is whether the human remains could be of Sámi descent. The Sámi people are, by law, considered to be indigenous people in Norway. The Sámi people and their parliament (*Sametinget*) have the right to be involved in processes and decisions that affect them, including matters of consent in relation to research on Sámi biological material and human remains. Due to these laws and protections, in order to conduct research on Sámi human remains one must be granted permission by the Sámi parliament as well as the institution that currently has the remains as part of their collection (National Research Ethics Committee, 2022). This is not the case for any of the individuals analysed in this thesis.

Another consideration is whether the identity of the individual is known and whether or not there are any known living relatives. This is important as living descendants would be updated throughout the examination process, and in relation to the results of the analysis (National Research Ethics Committee, 2022). This is also not the case for the individuals analysed in this thesis.

One also has to consider whether the methods are destructive to the remains, as human remains are a very fragile and limited source of information to archaeologists and other researchers. The methods used in this thesis, as outlined above, are all non-destructive, and the remains were handled as little as possible and with the utmost care during the analysis. Once the thesis is finished it will be made available digitally for other researchers to read and use further.

Chapter 6: Results

6.1 Ageing

Out of a total of 14 individuals, four (28.6%, 4/14) of them could not be aged. Ten out of the 14 (71.4%) could be aged. The largest proportion (42.9%, 6/14) fell within the 36-50 (adult) age range. Four (28.6%) of the individuals fell in the 19-35 (young adult) age range. None of the individuals were estimated to be under the age of 19 or over 50.

Age ranges	Number of individuals	Prevalence (%)
Juvenile (<91)	0	0
Young adult (19-35)	4*	28.6
Adult (36-50)	6	42.9
Old adult (> 50)	0	0
Unable to estimate	4	28.6

Table 5: Distribution of estimated age at death. * One of the individuals is likely older than the teeth indicate, due to potential overbite.

6.2 Sexing

Out of the 14 individuals three (21.4%) did not have the necessary elements preserved to estimate biological sex. None of the individuals were estimated as definitely male. Two of the 14 (14.3%) were estimated as probably male. One (7.1%) of the individuals was indeterminate. The largest proportion of individuals were estimate ed as probably female or female (57.1%, 8/14), there being four individuals estimated as probably female and four as definitely female: the prevalence therefore being 28.6% for each of these. Most of the estimations were based on the skull, as there were only three preserved pelvises (Two in Grave II + III, A4994 and one in Grave V, A4993).

Sex	Number of individuals	Prevalence (%)
Female	4	28.6
?Female	4	28.6
Indeterminate	1	7.1
?Male	2	14.3
Male	0	0
Unable to estimate	3	21.4

Table 6: Distribution of estimated biological sex.

6.3 Stature

When estimating the stature using the mathematical method, the height is given as a number +/- a few centimetres which gives you a range. To make the stature results easy to understand the heights were plotted in the groups where the height without the +/- number would be, for example, for an individual that got a result of 154.65 +/- 4.52, they were plotted in the 155-160 cm range. The raw data with the specific stature ranges for each individual can be found in the last table in this chapter (6.5 General Overview). The formulas used are by Sjøvold (1990), as shown in the table in the methodology chapter, under heading 5.3 Stature.

Six out of the 14 (42.9%) individuals did not have any long bones that were well enough preserved to estimate stature. The largest proportion of individuals were in the 160 - 165 cm range (21.4%, 3/14). The smallest proportion of individuals were in the 165-170 cm range (7.1%, 1/14). Both the 150 - 155 cm and 155 - 160 cm range had two individuals out of the 14 (14.3%).

Stature (cm)	Number of individuals	Prevalence (%)
150 – 155	2	14.3
155 - 160	2	14.3
160 – 165	3	21.4
165 – 170	1	7.1
Unable to estimate	6	42.9

Table 7: Distribution of estimated stature.

6.4 Pathology

Figure 8: Taphonomy on the proximal epiphysis of the left tibia from Grave IX (A4995) (Photo by author).

Nine out of the 14 (64.3%) skeletons had some kind of pathology present. Most of the individuals (66.6%, 6/9) had pathology on more than one element. Teeth were the most common (66.6%, 6/9) element to have some sort of pathology on them, with enamel hypoplasia being the most common. The one individual that had pathology on the skull had *cribra orbitalia*. Most of the long bones were excessively worn, except for the one femur which had an ossified muscle attachment. There was also a tibia from Grave IX (A4995) that had some sort of taphonomy on the proximal epiphysis that could indicate an underlying condition (see Figure 8). There is much general wear on the bones which could indicate heavy physical labour, or degeneration of the bones over time meaning the individual would be older. Wear of the teeth is common in this group of individuals and is most likely linked to diets consisting of course foods, meats, and dried fish (Richter & Eliasson, 2008).

Affected bone	Number of individuals
Teeth/Mandible/Maxilla (T/M/M)	6
Vertebrae	4
Humerus	2
Radius	2
Femur	1
Tibia	1
Skull	1

Table 8: Distribution of bones affected by pathology.

Grave number	Element(s) affected	Pathology
Grave I (A4991)	Teeth/Mandible/Maxilla (T/M/M)	Erosion on all teeth in the mandible, inside and outside
Grave V (A4993)	Humerus, T/M/M	Wear on the proximal humeral head. Calculus on all teeth, hypoplasia.
Grave VII (A7439)	Humerus, radius	Possible pathology/taphonomy on proximal and distal radial epiphysis. Wear on proximal humeral epiphysis.
Grave IX (A4995)	Tibia	Taphonomy, possible underlying condition on left tibia.
Grave X (A7440)	Radius, spine, skull, T/M/M	Pathology on distal ⅓ on the left radius. Bony growth on left articulating facet on cervical vertebra. *Cribra orbitalia* in right orbit. Abscess, outside of M1 (mandibular right).
Grave XI (A7441)	Spine, T/M/M	All vertebrae kind of fit badly, possibly due to lack of soft tissue; body fits well, but not neural arch. Enamel hypoplasia.
Grave XIb (A7441)	Femur, T/M/M	Ossification of muscle attachment on femur. Possible comingling of teeth, enamel hypoplasia.
Grave XIV (A7443)	Spine, T/M/M	Thinning of walls on L5. Enamel hypoplasia, broken P2 (mandibular left).
Grave XV (A7444)	Spine	Osteophytes on thoracic vertebrae.

Table 9: Overview of the pathology for each grave.

6.5 General overview

The table below shows the results from the age, biological sex, and stature estimations for each of the A-numbers. In the case of Cranium B (CB) in Grave XIV (A7443) the biological sex estimated was indeterminate (I), and the age range estimated was 18-25 years old. As this most likely was a rather young individual it could be that the sexual dimorphic traits had not yet finished developing entirely leading to an estimation of indeterminate. It is also a possibility that this individual simply does not have as defined sexual dimorphic traits as other individuals may have.

A-number	Grave	Age	Biological sex	Stature
A4991	I – IV	35-45	?F	-
A4992	II	35-45	?M	148.25-158.13
A4993	V	25-50	F	155.9-164.94
A4994	II + III*	Y: 25-40	Both: F	-
A4995	IX	35-50	-	152.07-160.29
A4995b + A7439	VII	-	?M	158.68-168.56
A7440	X	33-44	F	162.64-170.86
A7441	XI	18-30	?F	156.69-165.73
A7442	XIII	-	-	154.42-164.30
A7443	XIV**	CA: 25-45 CB: 18-25	CA: ?F CB: I	-
A7444	XV	-	I	-
A7445	XVI	-	?F	-
A7446	XIb	16-25	?F	146.43-155.47

Table 10: The results from the osteological analysis sorted by A-number. *There were two individuals under this A-number, they were named X and Y, as some elements clearly belonged together. **There were two crania under this A-number, they were named Cranium A (CA) and Cranium B (CB).

Chapter 7: Discussion

7.1 Older vs newer osteological methods

As can be seen from the table presented below most of the estimates of the biological sex differ from those presented in the excavation report. What increases the difficulty in answering research question 2 (*Is the sex, as estimated through newer osteological methods the same as the sex, as estimated previously?)* is the fact that there is no record of what methods specifically were used to analyse the human remains in the 1960s. In his letters Getz (1966) states that he is basing many of his estimations on the look of the bones and their size. We, unfortunately, do not know whether this was the only method used, and we have no documentation of the methods used to estimate the age at death or the stature of the individuals. However, the use of the pelvis for biological sex assessment was not common until the '70s, and it is clear that methods in osteological analyses have evolved over time, especially in the last 20 - 30 years (as can be seen from the methods presented in Jane Buikstra and Douglas Ubelaker's standards, 1994).

Another newer development has been the addition of 'probable male' and 'probable female' as categories when using some methods, like when assessing the cranial traits to estimate biological sex (Buikstra & Ubelaker, 1994). This allows for more nuance in the estimation of biological sex.

Grave (A-number)	Excavation report	Analysis for this thesis
Grave I (A4991)	F	?F
Grave II (A4992)	F	?M
Grave V (A4993)	F	F
Grave VII (A4995b + A7439)	F	?M
Grave X (A7440)	M	F
Grave XI (A7441)	M	?F
Grave XIb (A7446)*	(see A7441)	?F
Grave XV (A7444)	F	I
Grave XVI (A7445)	-	?F

Table 11: The results of biological sex estimations found in the excavation report and the results of the analysis done for this thesis. *A7441 & A7446 are both individually being treated as Grave XI.

Research question 1: Is the sex, as estimated through newer osteological methods the same as the sex, as estimated previously?

We see many differences between the biological sex estimations made by Getz (used in the excavation report by Marstrander) and the estimations made during the analysis for this thesis. If we count the categorisation 'female' or 'male' and 'probable female' or 'probable male' as different categories, only one of the estimations is the same (that for Grave V, A4993). If we count those categorizations as the same two of the estimations are the same (again Grave V, but also Grave I, A4991). It is important to remember that all the biological sex estimations for this thesis were based on the skull except the estimation for Grave V, which used both the pelvis and the skull to get the estimation. As highlighted in Chapter 5 (see 5.1.2), the dimorphic traits in the skull can be less apparent than in the pelvis, meaning estimations based on the pelvis are more reliable. The results here, highlight the importance of redoing the biological profile if it has been a while since the remains were last analysed. If this information is not updated, it could lead to incorrect information being used by other researchers who may not have the expertise, training, or the time to do their own analysis. We also get a more nuanced picture of the remains with the 'probable male' and 'probable female' categories, leading to a better understanding of the limitations of osteological analysis

7.2 The grave goods vs osteological estimations

7.2.1 The grave goods

The table below (see Table 12) shows the grave goods that were found at the Jøa site. This information is taken directly from the original excavation report (Marstrander, 1968). As can be seen from Table 12 and Table 13 a variety of grave goods were found at the site ranging from iron knives to a bronze finger ring. There is also a variety in the amount of grave goods found in each of the graves. Ten out of the 24 graves had grave goods, and grave goods were only found in graves that had human remains as well. Grave XVI had the largest number of grave goods, containing 59 glass pearls, 3 spiral shaped bronze pearls, a bronze finger ring, a bronze arm ring, a key ring with three keys attached, three oval bronze brooches, an iron belt buckle, and an iron knife. In 8 out of the 10 graves with grave goods, a knife was found, usually specified to be an iron knife. This makes the knife the most

common item to be deposited. There are also several items which are only found once in one of the graves (comb, bronze finger ring, bronze arm ring, key ring with keys, iron belt buckle and the iron nail). This variety is expected, as highlighted by Dommasnes (1982, p. 71) in her work. It seems to be more likely that weaponry was never deposited in the graves initially rather than it not surviving, considering other objects of various metals have survived in the graves.

Grave	Grave goods
Grave III	Oval bronze brooch
Grave V	Knife
Grave VI	Iron brooch, iron scissor, knife x2
Grave VII	Oval bronze brooch
Grave X	Glass pearls x2, knife x2, large pearls x5, comb, animal shaped brooch
Grave XI	Knife
Grave XIII	Knife
Grave XIV	Glass pearls x59, spiral shaped bronze pearls x3, bronze finger ring, bronze arm ring, key ring + 3 keys, oval bronze brooches x3, iron belt buckle, iron knife
Grave XV	Iron nail, iron knife
Grave XVI	Iron knife

Table 12: The type and number of grave goods found in each of the graves with grave goods.

Grave good type	Number found at the site	Number of graves with at least one
Oval bronze brooch	5	3
Knife	10	8
Iron brooch	1	1
Iron scissor	1	1
Glass pearls	61	2
Pearls	5	1
Comb	1	1
Spiral shaped bronze pearls	3	1

Grave good type	Number found at the site	Number of graves with at least one
Bronze finger ring	1	1
Bronze arm ring	1	1
Key ring + keys	1	1
Iron belt buckle	1	1
Iron nail	1	1
Animal shaped brooch	1	1

Table 13: Frequency and distribution of the grave goods (by type).

7.2.2 Estimations based on grave goods

The table below (see Table 14) shows the biological sex estimations based on the grave goods. It is important to highlight that methods of estimating sex based on grave goods have not developed along with the theoretical discussions surrounding sex and gender and how they are expressed. These estimations are based on the information presented in Chapter 2 (see 2.2.2). Brooches (especially oval brooches) are most often associated with female graves as they are thought to be part of women's dress. This does not mean that the individual is definitely female, but it is statistically more likely. The key ring with the keys is also often associated with female burials, as women were seen as the heads of the home (Solberg, 1985), especially as men started travelling more throughout the Late Iron Age. However, this notion has been challenged recently by Heidi Lund Berg (2021), who highlights that keys were used not only in the home for a variety of tasks which were not limited to women. Graves that contain only knives have not been given a biological sex estimation as knives were used by both men and women and they were used in large variety of both every day and special activities that are not related to a specific gender or sex unlike other activities. There is no pattern to the deposition of knives, except that most burials contain them (Lund & Moen, 2019).

Grave (A-number)	Grave goods	Sex estimation
Grave III (A4994)	Oval bronze brooch	F
Grave V (A4993)	Knife	-

Grave (A-number)	Grave goods	Sex estimation
Grave VI*	Iron brooch, iron scissor, knife x2	
Grave VII (A4995b + A7439)	Oval bronze brooch	F
Grave X (A7440)	Glass pearls x2, knife x2, large pearls x5, comb, animal shaped brooch	F
Grave XI (A7441)	Knife	-
Grave XIII (A7442)	Knife	-
Grave XIV (A7443)	Glass pearls x59, spiral shaped bronze pearls x3, bronze finger ring, bronze arm ring, key ring + 3 keys, oval bronze brooches x3, iron belt buckle, iron knife	F
Grave XV (A7444)	Iron nail, iron knife	-
Grave XVI (A7445)	Iron knife	-

Table 14: Sex estimations based on grave goods. *This skeleton is not present in the current collection.

Sverre Marstrander in the excavation report is critical to some of the biological sex estimations made by Getz due to the grave goods found. In most cases he has simply written that the grave goods would imply a 'female' or 'male' burial, but also includes the estimations by Getz (Marstrander, 1968). In the article that he wrote in 1978 for Årbok for Namdalen he has changed the biological sex estimations to fit with his estimations based on the grave goods. If we see these three estimations (Excavation report, Årbok for Namdalen, and the estimations for this thesis) next to each other it becomes clear that more of the estimations are the same after Marstrander changes them due to the grave goods, though there are still only four that are the same (counting F and ?F, and M and ?M as the same).

Grave (A-number)	Excavation report	Årbok for Namdalen	Analysis for this thesis
Grave I (A4991)	F	F	?F
Grave II (A4992)	F	M	?M

Grave (A-number)	Excavation report	Årbok for Namdalen	Analysis for this thesis
Grave V (A4993)	F	F	F
Grave VII (A4995b + A7439)	F	F	?M
Grave X (A7440)	M	F	F
Grave XI (A7441)	M	M	?F
Grave XIb (A7446)*	(see A7441)	M	?F
Grave XV (A7444)	F	F	I
Grave XVI (A7445)	-	-	?F

Table 15: Biological sex estimations from the excavation report, Årbok for Namdalen and for the analysis of this thesis. *A7441 & A7446 are both individually being treated as Grave XI.

7.2.3 Grave good estimations vs osteological estimations

Research question 2: Is the sex, as estimated through osteological analysis, and the sex, as estimated through grave goods, the same?

Below are the biological sex estimations based on the grave goods and the biological sex estimations derived from the osteological analysis done for this thesis. Though there are few estimations based on the grave goods, three out of the five estimations match with the estimations from the osteological analysis. This is of course, if we count Cranium A from Grave XIV (A7443) as the correct one. If Cranium B is counted as the correct one, just under half (2/5) of the estimations match up. In the case of Grave VI there is an estimation based on grave goods, but there is no estimation from osteological methods since this skeleton was not present in the collection. In cases like this, where there is no skeletal material available it could be useful to use grave goods.

Grave (A-number)	Grave goods estimation	Analysis for this thesis
Grave III (A4994)	F	F
Grave V (A4993)	-	F
Grave VI*	F	-

Grave (A-number)	Grave goods estimation	Analysis for this thesis
Grave VII (A4995b + A7439)	F	?M
Grave X (A7440)	F	F
Grave XI (A7441)	-	?F
Grave XIII (A7442)	-	-
Grave XIV (A7443)	F	CA: ?F | CB: I**
Grave XV (A7444)	-	I
Grave XVI (A7445)	-	?F

Table 16: Biological sex estimations based on the grave goods and based on the osteological analysis. *This skeleton is not present in the current collection. **CA: Cranium A | CB: Cranium B.

Research question 3: If the osteologically estimated sex and the sex as estimated through grave goods do not match up, why may this be?

From the skeletal remains that have been analysed for this thesis there are two instances where the osteologically estimated biological sex and the biological sex estimated through grave goods do not match up. Grave VII (A4995b + A7439) contains one oval bronze brooch, which is usually associated with female graves. However, the osteological examination of the parts of the skull that were preserved gave a result of 'probable male'. As the skull may have less defined differences between males and females, there is the possibility that this result is in reality not accurate, in which case the two estimations could match up. There is also the option that the brooch in this case does not signify a female burial, but perhaps an individual that was given the brooch as a present, or simply an individual that wore a brooch that was not biologically female. It is also difficult to gain any idea about the individual who has been buried based on one single item recovered from the grave.

A larger number of grave goods can highlight the interactions between roles a person may have in a community and can give us a more nuanced picture of an individual, their self-expression, and how they were perceived by others. For example, a single knife tells us extraordinarily little as knives were used by most people in relation to all sorts of roles and activities, and there is no pattern, generally, between knives and deposition (Lund & Moen, 2019). Certain grave

goods are linked to certain activities, and certain activities are linked, primarily though not exclusively, to a specific group of people (see Dommasnes, 1982; Solberg, 1985, 2003). However, not all grave goods represent an activity or a group of people like this, as has been highlighted through knives deposited in graves. What is important to highlight is that there are almost always exceptions to these 'rules' as was demonstrated in Chapter 2 (see 2.2.2).

When we consider the theoretical basis for this thesis there are also some ideas that can explain why the osteologically estimated biological sex may not match up with the biological sex as estimated through grave goods. One of the main points the theory highlighted is that biological sex and social sex are two different things, and one is not based on the other. As Sofaer (2006) highlights in her work,

> In archaeology, the biological body has become synonymous with nature as an equation is made between osteoarchaeology as a branch of investigation linked to the biological sciences and the investigation of the biological body as a natural entity. By contrast, the social, interpreted and discursively orchestrated body is regarded as the province of culture. (pp. 51-52)

Biological sex is a useful indicator for archaeologists to try and understand people and communities in the past based on the information they have. It is difficult for us today to attempt to understand how individuals presented themselves and how they were perceived by others, meaning social sex is an aspect that is harder to estimate and understand. It is incredibly difficult for us to understand social norms and culture from the past, especially in regard to self-expression.

7.3 The effect of excavation methods and the curation process

There is a significant lack of documentation and information surrounding the human remains that were used for this thesis. The excavation repot is the only source of information about the excavation itself, and it has limited information about the geographical location, decisions and interpretations that were made along the way, and the human remains themselves. There are letters from Getz (1966) at the Anatomical Institute which show that measurements were taken of the skeletal elements, and this led to the biological sex estimations. There is no indication if any other methods were used, there is also no indication what methods were used for the age or the stature

estimations. The only information that is presented about the skeletal remains is the age-at-death estimation, the biological sex estimation, and the stature estimation. There is no information about potential pathology on the remains. There is little information about burial rites or other contextual information in regard to the human remains in the main sources used (as presented in 4.4).

Following the publication of Sverre Mastrander's article in 1978 in *Årbok for Namdalen*, there is no further official publication (other than a couple of master's and bachelor's theses) about the remains or concerning the site itself. The remains have been archived all this time, with no indication of any kind of analysis being done on them.

The university museums in Norway have had little osteological expertise since osteology and physical anthropology became an interest in regard to archaeology in the early 1900s. The remains from Jøa came to the Anatomical Institute in the 1960s, a time that was characterized by changes and an attempt to uphold the anthropological research that had been done there previously. No one had the needed knowledge on excavation, documentation and curation of human remains as it was still being developed at this time. This development took time due to the focus on physical anthropology and other aims the institute had previously, particularly in the interwar period.

Human remains can give a unique insight into the past, and as human remains become a more valuable resource for archaeologists with new methods being developed, it is important that the documentation of these human remains is correct. Based on the information given in the excavation report and the remains that are now in the collection it is clear that there are elements missing. They may have been intentionally removed, although this is not documented anywhere, or they may have been accidentally misplaced or lost.

However, what is interesting is that it is the same element (the pelvis) which is missing in most cases. As it is consistently the same element that is missing, it is unlikely that this was not a deliberate removal. This would not have been a problem if this had been documented or indicated somewhere. Researchers should be able to look up information about the remains they want to use in their work, and there should be documentation of every decision that has been made regarding the remains, and their excavation and curation. There should be documentation concerning each of the remains. One skeleton is one individual, meaning that all information about all skeletons is important. There is nothing that should be left out or generalized when

it comes to human remains in archaeology. An individual represents an individual not an entire population or group.

In archaeology, context is vitally important to draw accurate conclusions about the past. Context can be described as the material surrounding a find (sand, dirt, clay, etc.) and its relation to other archaeological finds, whether those are material culture, human remains, or structures (Renfrew & Bahn, 2020, p. 50). There is also a distinction between primary and secondary contexts, where a find is still in its primary context if it has remained undisturbed in the same location where it was originally deposited. A secondary context is therefore a find that has been disturbed. The distinction between these two is important as well, as different conclusions can be drawn depending on if a find is discovered in its primary context or in a secondary context (Renfrew & Bahn, 2020, p. 50).

In the excavation report there is some documentation of context, mostly in the form of details concerning how deep in the burial pits certain remains and grave goods were found. There is also some information regarding how the various graves lie in relation to each other (Marstrander, 1968). This is important contextual information. However, there is also contextual information that has been lost because some of the physical remains do not match up with the information that has been given in the report. These inconsistencies make it difficult to know what information is correct, and also means that some of the contextual information given in the report is no longer useful information as the remains that it is related to is either missing or does not match up. This challenge also highlights the importance of the interplay between information collected during the excavation and how the remains and the related information is curated after excavation and analysis. Coming back to the discussion Schreiner and Brøgge had about who should have the responsibility of excavation and curation of human remains in Norway, we see a distinct advantage in the archaeological institutions having this responsibility, as the contextual information will be preserved in an archaeological collection rather than in an anatomical collection.

Chapter 8: Conclusions and recommendations

8.1 Conclusions

This thesis has attempted to evaluate the correlation between earlier osteological sex determinations and new osteological sex determinations with up-to date methods, and at the same time discuss the relationship between sex determinations based on osteological remains and archaeological material. Several research questions were established to attempt to make it easier to reach the main aim, as well as tackling the challenges faced during the analysis and subsequent collation of information. The first research question concerned newer osteological methods and whether they gave different estimations than the estimations made with older methods. The second research question asked whether the estimated biological sex from the osteological analysis matches with the estimations made using grave goods. The third research question then asked why the estimations from grave goods and from osteological methods may not have match up. Finally, the fourth research question asked what effect the excavation and curation processes have had on the material.

As Chapter 3 highlighted, biological sex does not make the basis for social sex or gender. However, in archaeology, we must often work with the information we have, making it even more important to be critical of the sources and methods used. As has been shown above, it is possible that grave goods can give an indication of the biological sex; however, what is really important is that researchers are aware of the limitations of this method. Using grave goods to estimate biological sex will never be 100% accurate, like many methods in archaeology, and it is vital to make the distinction between biological sex and social sex. Though exceptions are often a small part of a larger population, human remains represent individuals, and they must therefore be given the respect of being treated as such even in death. Using grave goods can lead to the conclusion that an individual *most likely* was 'female' or 'male', but some time and space must be dedicated to explaining that there could be a different answer. It is also crucial to evaluate the grave goods based on information about past societies not from modern ideas about sex, gender and associated activities and tools. Even though there is always some bias, researchers should be aware that there may be bias and highlight this in their work.

When considering whether grave goods can be used to estimate biological sex, the answer is complicated. Grave goods represent how the still living perceived the deceased individual, which is more akin to social sex. However, through research archaeologists have found that certain activities are tied to certain groups of people. Grave goods can give an indication of the statistically most likely biological sex; and if there are no human remains to osteologically analyse this is information that would otherwise be impossible for archaeologists to estimate. Whether this method is successful depends on *what* grave goods have been deposited as well as the number of artefacts. The more grave goods there are, the better.

What has also become abundantly clear through this thesis is that the world of archaeology and specifically osteoarchaeology must develop a set of standards for the excavation, documentation and curation of human remains. Due to the lack of such standards, there is a severe lack of documentation which has led to a significant loss of knowledge. Archaeologists are losing sources of information due to the lack of standards. This has been especially clear in this thesis due to the significance and unique nature of the human remains and their burial style, as well as the fact that there were few individuals to begin with. Detailed documentation of decisions, interpretations and analyses that are done along the way make the remains more accessible to researchers who may otherwise not have the expertise. Human remains that have not been analysed in a significant amount of time (~20 years) should be analysed again with new osteological methods. This also helps researchers who may not have the expertise to do these analyses themselves, to make sure that other research is done using up to date information that is as correct as possible.

8.2 Recommendations

Though some conclusions were drawn based on the remains from the sitting graves on Jøa, further research should be done on remains from other geographical locations and from other time periods. There are also more burials with human remains and grave goods that can be found on Jøa, and they could be part of a larger project looking at the link between grave goods and biological and social sex in relation to Jøa specifically and the people that have lived there throughout time. If more research is done on grave goods and their link to biological and social sex, the more reliably archaeologists in the future can use grave

goods to inform their interpretations, *with* an understanding of the limitations of this method.

This thesis has also been able to highlight the lack of documentation and excavation standards in relation to human remains. As human remains become an ever more important source of information with the rise in aDNA projects and the like, Norway as a whole should implement some standards that outline how human remains are best excavated and documented, as well as curated and sampled.

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Appendix A – The Skeletal Information Sheet

All the recording forms for each of the A-numbers. Pages have been left out if there was no recorded information on them.

A4991, Grave I - IV

Skeletal Analysis

A-T-number:	A.4991
Site:	Sandvika, Jøa

Notes (e.g. pathology, cutmarks):

Suspicious to have three vertebrae, one from each category (cervical, thoracic, lumbar)

Skeletal inventory

x = present

· = not present

Cranial bones and joint surfaces

	L	R
Frontal	x	x
Parietal	x	x
Occipital	x	
Temporal		
TMJ		

	L	R
Sphenoid		
Zygomatic		
Maxilla		
Palatine		
Mandible	x	x

Postcranial bones and joint surfaces

	L	R
Clavicle	x	
Scapula		
Body		
Glenoid f.		
Patella		
Sacrum		

	L	R
Os coxae		
Ilium		
Ishium		
Pubis		
Acetabulum		
Auric. surface		

Vertebrae		
	Centrum	Neural arch
C1		
C2		
C7		
T10		
T11		
T12		
L1		
L2		
L3		
L4		
L5		
# present/# complete		
C3-6		
T1-T9		

Ribs (individual)		
	L	R
1st		
2nd		
11th		
12th		

Ribs (3-10)		
# present/# complete		
L	R	Unsided

Sternum	
Manubrium	
Body	

			Diaphysis			
	Side	Proximal epiphysis	Proximal third	Middle third	Distal third	Distal epiphysis
Humerus	Left					
Humerus	Right					
Radius	Left					
Radius	Right					
Ulna	Left					
Ulna	Right					
Femur	Left					
Femur	Right					
Tibia	Left					
Tibia	Right					
Fibula	Left					
Fibula	Right					

Hand/foot elements

Talus	Left		Calcaneus	Left	
Talus	Right		Calcaneus	Right	

	# present/# complete		
	L	R	Unsided
Carpals			
Metacarpal			
Phalanges (hand)			
Tarsals			
Metatarsal			
Phalanges (foot)			

Notes

1C, 1T & 1L

Age-at-death/sex indicators

Sex

Pelvis

	L	R
Ventral arc (1-3)[a]		
Subpubic concavity (1-3)[a]		
Ischiopubic ramus (1-3)[a]		
Greater sciatic notch (1-5)[c]		
Preauricular sulcus (0-4)[b]		

Estimated sex, pelvis (1-5)[c] _____

Skull

	L	M	R
Nuchal crest (1-5)[c]		2	
Mastoid process (1-5)[c]	2		-
Supraorbital margin (1-5)[c]	-		3
Glabella (1-5)[c]	4		4
Mental eminence (1-5)[c]		-	
Mental ramus (1-5)c	2		2

Estimated sex, skull (1-5)[c] 2

Age

Pubic symphysis

	L	R
Todd (1-10)[d]		
Suchey-Brooks (1-6)[d]		
Auricular surface (1-8)[d]		
Clavicle		

Estimated age _____

a. 1 = female
2 = indeterminate
3 = male

b. 0 = absent
1 = maximum expression
4 = minimum expression

c. 1 = definite female
2 = probable female
3 = indeterminate
4 = probable male
5 = definite male

d. See Buikstra & Ubelaker 1994 for age groups

Dental inventory recording form: development, wear, and pathology (permanent teeth)

	Tooth		Presence	Development	Wear		Total wear	Caries			Abscess	Calculus/affected surface
Maxillary Right	1	M^3										
	2	M^2										
	3	M^1										
	4	P^2										
	5	P^1										
	6	C										
	7	I^2										
	8	I^1										
Maxillary Left	9	I^1										
	10	I^2										
	11	C										
	12	P^1										
	13	P^2										
	14	M^1										
	15	M^2										
	16	M^3										
Mandibular Left	17	M_3	2		3	3						Mandible, erosion of some type on all teeth, inside and outside
	18	M_2	2		9	9						
	19	M_1	2		9	9						

	Tooth		Presence	Development	Wear		Total wear	Caries			Abscess	Calculus/affected surface
Mandibular Left	20	P_2										
	21	P_1										
	22	C										
	23	I_2										
	24	I_1										
Mandibular Right	25	I_1										
	26	I_2										
	27	C										
	28	P_1										
	29	P_2										
	30	M_1	2		3	3						
					3	3						
	31	M_2										
	32	M_3	2		6	7						
					6	7						

Estimated age (juveniles)
Estimated age (Brothwell) 35-45
Estimated age (Miles) 36-43

Supernumerary teeth

Position between teeth	Location (1-4)	Position between teeth	Location (1-4)	Position between teeth	Location (1-4)

Postcranial measurements

		L	R
Clavicle	Maximum length	143mm	
	Ant.-Post. diameter at midshaft	13mm	
	Sup.-Inf. diameter at midshaft	7mm	
Humerus	Maximum length		
	Epicondylar breadth		
	Vertical diameter of head		
Radius	Maximum length		
	Ant.-Post. diameter at midshaft		
	Med.-Lat. diameter at midshaft		
Ulna	Maximum length		
	Ant.-Post. diameter at midshaft		
	Med.-Lat. diameter at midshaft		
Sacrum	Maximum transverse diameter of base		
Femur	Maximum length		
	Epicondylar length		
	Maximum diameter of the femoral head		
Tibia	Length		
	Maximum proximal epiphyseal breadth		
	Maximum distal epiphyseal breadth		
Fibula	Maximum length		
	Maximum diameter at midshaft		

A4992, Grave II

Skeletal Analysis

A-number: A.4992
T-number: T28747
Site: Sandvika, Jøa

Notes (e.g. pathology, cutmarks):

Skeletal inventory

x = present
· = not present

Cranial bones and joint surfaces

	L	R
Frontal		x
Parietal		x
Occipital		x
Temporal		x
TMJ		x

	L	R
Sphenoid		x
Zygomatic		x
Maxilla	x	x
Palatine	x	x
Mandible	x	x

Postcranial bones and joint surfaces

	L	R
Clavicle		
Scapula	x	x
Body		
Glenoid f.		
Patella		
Sacrum		

	L	R
Os coxae		
Ilium		
Ishium		
Pubis		
Acetabulum		
Auric. surface		

Vertebrae		
	Centrum	Neural arch
C1		
C2	x	x
C7		
T10		
T11		
T12		
L1		
L2		
L3		
L4		
L5		
# present/# complete		
C3-6	3/3	3/3
T1-T9	6/6	6/6

Ribs (individual)		
	L	R
1st		
2nd		
11th		
12th		

Ribs (3-10)		
# present/# complete		
L	R	Unsided

Sternum	
Manubrium	
Body	

			Diaphysis			
	Side	Proximal epiphysis	Proximal third	Middle third	Distal third	Distal epiphysis
Humerus	Left	x	x	x	x	x
Humerus	Right					
Radius	Left	x	x	x	x	x
Radius	Right					
Ulna	Left	x	x	x	x	x
Ulna	Right					
Femur	Left					
Femur	Right					
Tibia	Left					
Tibia	Right					
Fibula	Left					
Fibula	Right					

Hand/foot elements

Talus	Left		Calcaneus	Left	
Talus	Right		Calcaneus	Right	

	# present/# complete		
	L	R	Unsided
Carpals			
Metacarpal			
Phalanges (hand)			
Tarsals			
Metatarsal			
Phalanges (foot)			

Notes

Age-at-death/sex indicators

Sex

Pelvis	L	R
Ventral arc (1-3)[a]		
Subpubic concavity (1-3)[a]		
Ischiopubic ramus (1-3)[a]		
Greater sciatic notch (1-5)[c]		
Preauricular sulcus (0-4)[b]		

Estimated sex, pelvis (1-5)[c] _____

Skull	L	M	R
Nuchal crest (1-5)[c]		4	
Mastoid process (1-5)[c]	-		3
Supraorbital margin (1-5)[c]	5		5
Glabella (1-5)[c]	2		2
Mental eminence (1-5)[c]		3-4	
Mandibular ramus (1-5)c	2-3		2-3

Estimated sex, skull (1-5)[c] 4

Age

Pubic symphysis	L	R
Todd (1-10)[d]		
Suchey-Brooks (1-6)[d]		
Auricular surface (1-8)[d]		

Estimated age _____

a. 1 = female
2 = indeterminate
3 = male

b. 0 = absent
1 = maximum expression
4 = minimum expression

c. 1 = definite female
2 = probable female
3 = indeterminate
4 = probable male
5 = definite male

d. See Buikstra & Ubelaker 1994 for age groups

Dental inventory recording form: development, wear, and pathology (permanent teeth)

	Tooth		Presence	Development	Wear		Total wear	Caries			Abscess	Calculus/affected surface
Maxillary Right	1	M^3	1		4	5						
					4	5						
	2	M^2	2		5	6						
					5	6						
	3	M^1	2		6	7						
					6	7						
	4	P^2	2		4	4						
	5	P^1	2		4	3						
	6	C	1		2	2						
	7	I^2	1		1	1						
	8	I^1										
Maxillary Left	9	I^1										
	10	I^2	1		1	1						
	11	C	1		3	3						
	12	P^1	2		3	4						
	13	P^2	1		5	5						
	14	M^1	2		7	6						
					7	6						
	15	M^2	2		5	5						
					5	5						
	16	M^3										
Mandibular Left	17	M_3	1		5	5						
					5	5						
	18	M_2	2		8	8						
					8	8						
	19	M_1	2		8	8						
					8	8						

	Tooth		Presence	Development	Wear		Total wear	Caries			Abscess	Calculus/affected surface
Mandibular Left	20	P_2										
	21	P_1	2		2	2						
	22	C	2		1	1						
	23	I_2										
	24	I_1										
Mandibular Right	25	I_1										
	26	I_2	1		1	1						
	27	C	1		1	1						
	28	P_1										
	29	P_2	2		3	3						
	30	M_1	2		6	6						
					6	6						
	31	M_2	2		7	7						
					7	7						
	32	M_3	1		5	5						
					5	5						

Estimated age (juveniles)
Estimated age (Brothwell) 35-45
Estimated age (Miles) 36-45

Supernumerary teeth

Position between teeth	Location (1-4)	Position between teeth	Location (1-4)	Position between teeth	Location (1-4)

Postcranial measurements

		L	R
Clavicle	Maximum length		
	Ant.-Post. diameter at midshaft		
	Sup.-Inf. diameter at midshaft		
Humerus	Maximum length	291mm	
	Epicondylar breadth	54mm	
	Vertical diameter of head	39mm	
Radius	Maximum length	215mm	
	Ant.-Post. diameter at midshaft		
	Med.-Lat. diameter at midshaft	13mm	
Ulna	Maximum length	240mm	
	Ant.-Post. diameter at midshaft		
	Med.-Lat. diameter at midshaft	16mm	
Sacrum	Maximum transverse diameter of base		
Femur	Maximum length		
	Epicondylar length		
Tibia	Length		
	Maximum proximal epiphyseal breadth		
	Maximum distal epiphyseal breadth		
Fibula	Maximum length		

A4993, Grave V

Skeletal Analysis

A-number:	A.4993
T-number:	T.18646
Site:	Sandvika, Jøa

Notes (e.g. pathology, cutmarks):

Wear on the proximal humeral head

Skeletal inventory

x = present
· = not present

Cranial bones and joint surfaces

	L	R
Frontal		
Parietal		
Occipital		
Temporal		
TMJ		

	L	R
Sphenoid		
Zygomatic		
Maxilla		
Palatine		
Mandible	x	x

Postcranial bones and joint surfaces

	L	R
Clavicle		
Scapula	x	x
Body		
Glenoid f.		
Patella		
Sacrum	x	x

	L	R
Os coxae	x	x
Ilium	x	x
Ishium		x
Pubis		x
Acetabulu	x	x
Auric. surface	x	x

Vertebrae		
	Centrum	Neural arch
C1	x	x
C2	x	x
C7	x	x
T10	x	x
T11	x	x
T12	x	x
L1	x	x
L2	x	x
L3	x	x
L4	x	x
L5	x	x
# present/# complete		
C3-6	-	-
T1-T9	6/6	6/6

Ribs (individual)		
	L	R
1st		
2nd		
11th		
12th		

Ribs (3-10)		
# present/# complete		
L	R	Unsided

Sternum	
Manubriu	
Body	

			Diaphysis			
	Side	Proximal epiphysis	Proximal third	Middle third	Distal third	Distal epiphysis
Humerus	Left	x	x	x	x	x
Humerus	Right	x	x	x	x	x
Radius	Left	x	x			
Radius	Right	x	x	x		
Ulna	Left	x	x			
Ulna	Right	x	x	x		
Femur	Left	x	x			x
Femur	Right	x	x	x	x	x
Tibia	Left	x	x	x	x	x
Tibia	Right	x	x	x		
Fibula	Left			x	x	x
Fibula	Right		x	x	x	

Hand/foot elements

Talus	Left		Calcaneus	Left	
Talus	Right		Calcaneus	Right	

	# present/# complete		
	L	R	Unsided
Carpals			
Metacarpal			
Phalanges (hand)			
Tarsals			
Metatarsal			
Phalanges (foot)			

Notes

Age-at-death/sex indicators

Sex

Pelvis	L	R
Ventral arc (1-3)[a]		2
Subpubic concavity (1-3)[a]		1
Ischiopubic ramus (1-3)[a]		1
Greater sciatic notch (1-5)[c]	2	3
Preauricular sulcus (0-4)[b]	4	0

Estimated sex, pelvis (1-5)[c] 1

Skull	L	M	R
Nuchal crest (1-5)[c]		2	
Mastoid process (1-5)[c]	3		2
Supraorbital margin (1-5)[c]	3		3
Glabella (1-5)[c]	2		2
Mental eminence (1-5)[c]		2	
Mandibular ramus (1-5)c	1-2		1-2

Estimated sex, skull (1-5)[c] 2

Age

Pubic symphysis	L	R	
Todd (1-10)[d]		7	39-44
Suchey-Brooks (1-6)[d]		3	22-55 (33)
Auricular surface (1-8)[d]	5	4-5	35-44

Estimated age 33-44

a. 1 = female
2 = indeterminate
3 = male

b. 0 = absent
1 = maximum expression
4 = minimum expression

c. 1 = definite female
2 = probable female
3 = indeterminate
4 = probable male
5 = definite male

d. See Buikstra & Ubelaker 1994 for age groups

Dental inventory recording form: development, wear, and pathology (permanent teeth)

	Tooth		Presence	Development	Wear		Total wear	Caries			Abscess	Calculus/affected surface
Maxillary Right	1	M^3	1		4	5						Calculus on all teeth, excessive on right maxillary molars outside
					4	5						
	2	M^2	1		5	10?						Either significant wear on the inside or broken postmortem
					5	10?						
	3	M^1	2		6	8						
					6	9						
	4	P^2	2		5	5						
	5	P^1	2		6	6						
	6	C	1		6	6						hypoplasia
	7	I^2										
	8	I^1										
Maxillary Left	9	I^1										
	10	I^2										
	11	C	1		5	5						hypoplasia
	12	P^1	2		5	5						
	13	P^2										
	14	M^1									inside + outside	
	15	M^2	4									
	16	M^3	4									
Mandibular Left	17	M_3	2		4	4						
					4	4						
	18	M_2	2		9	9						
					9	9						
	19	M_1	2		10	10						
					10	9						

	Tooth		Presence	Development	Wear		Total wear	Caries			Abscess	Calculus/affected surface
Mandibular Left	20	P_2	1		4	3						
	21	P_1	2		4	3						
	22	C	1		5	5						
	23	I_2										
	24	I_1										
Mandibular Right	25	I_1										
	26	I_2										
	27	C										
	28	P_1	2		4	4						
	29	P_2	2		6	6						
	30	M_1	2		10 10	10 10						
	31	M_2	4									
	32	M_3	4									

Estimated age (juveniles) _____
Estimated age (Brothwell) 25-45
Estimated age (Miles) 25-50

Supernumerary teeth

Position between teeth	Location (1-4)	Position between teeth	Location (1-4)	Position between teeth	Location (1-4)

Postcranial measurements

		L	R
Clavicle	Maximum length	136mm	135mm
	Ant.-Post. diameter at midshaft	8mm	10mm
	Sup.-Inf. diameter at midshaft	7mm	7mm
Humerus	Maximum length	300mm	330mm
	Epicondylar breadth	53mm	54mm
	Vertical diameter of head	41mm	42mm
	Maximum diameter midshaft	18mm	19mm
Radius	Maximum length		
	Ant.-Post. diameter at midshaft		
	Med.-Lat. diameter at midshaft		
Ulna	Maximum length		
	Ant.-Post. diameter at midshaft		
	Med.-Lat. diameter at midshaft		
Sacrum	Anterior superior breadth	110 mm	
	Maximum transverse diameter of base	52 mm	
Femur	Maximum length		420mm
	Epicondylar length	62mm	64mm
	Maximum diameter of the femoral head		39mm
Tibia	Length		330mm
	Maximum proximal epiphyseal breadth		
	Maximum distal epiphyseal breadth	40mm	
Fibula	Maximum length		

A4994, Grave II & III

Individual X

Skeletal Analysis

A-number:	A4994x
T-number:	
Site:	Sandvika, Jøa

Notes (e.g. pathology, cutmarks):

Skeletal inventory

x = present
· = not present

Cranial bones and joint surfaces

	L	R
Frontal		
Parietal		
Occipital		
Temporal		
TMJ		

	L	R
Sphenoid		
Zygomatic		
Maxilla		
Palatine		
Mandible		

Postcranial bones and joint surfaces

	L	R
Clavicle		
Scapula		
Body		
Glenoid f.		
Patella		
Sacrum	x	x

	L	R
Os coxae	x	x
Ilium	x	x
Ishium	x	x
Pubis		
Acetabulu	x	x
Auric. surface	x	x

Vertebrae		
	Centrum	Neural arch
C1		
C2		
C7		
T10		
T11		
T12		
L1		
L2		
L3		
L4	x	x
L5	x	x
# present/# complete		
C3-6		
T1-T9		

Ribs (individual)		
	L	R
1st		
2nd		
11th		
12th		

Ribs (3-10)		
# present/# complete		
L	R	Unsided

Sternum	
Manubriu	
Body	

			Diaphysis			
	Side	Proximal epiphysis	Proximal third	Middle third	Distal third	Distal epiphysis
Humerus	Left					
Humerus	Right					
Radius	Left					
Radius	Right					
Ulna	Left					
Ulna	Right					
Femur	Left	x	x	x	x	
Femur	Right	x	x	x	x	x
Tibia	Left					
Tibia	Right					
Fibula	Left					
Fibula	Right					

Hand/foot elements

Talus	Left	
Talus	Right	

Calcaneus	Left	
Calcaneus	Right	

	# present/# complete		
	L	R	Unsided
Carpals			
Metacarpal			
Phalanges (hand)			
Tarsals			
Metatarsal			
Phalanges (foot)			

Notes

Age-at-death/sex indicators

Sex

Pelvis

	L	R
Ventral arc (1-3)[a]		
Subpubic concavity (1-3)[a]		
Ischiopubic ramus (1-3)[a]		
Greater sciatic notch (1-5)[c]	1	1
Preauricular sulcus (0-4)[b]	1	1
Composite Arc (1-3)a	1	1

Estimated sex, pelvis (1-5)[c] 1

Skull

	L	M	R
Nuchal crest (1-5)[c]			
Mastoid process (1-5)[c]			
Supraorbital margin (1-5)[c]			
Glabella (1-5)[c]			
Mental eminence (1-5)[c]			

Estimated sex, skull (1-5)[c] _____

Age

Pubic symphysis

	L	R
Todd (1-10)[d]		
Suchey-Brooks (1-6)[d]		
Auricular surface (1-8)[d]		

Estimated age _____

a. 1 = female
2 = indeterminate
3 = male

b. 0 = absent
1 = maximum expression
4 = minimum expression

c. 1 = definite female
2 = probable female
3 = indeterminate
4 = probable male
5 = definite male

d. See Buikstra & Ubelaker 1994 for age groups

Postcranial measurements

		L	R
Clavicle	Maximum length		
	Ant.-Post. diameter at midshaft		
	Sup.-Inf. diameter at midshaft		
Humerus	Maximum length		
	Epicondylar breadth		
	Vertical diameter of head		
Radius	Maximum length		
	Ant.-Post. diameter at midshaft		
	Med.-Lat. diameter at midshaft		
Ulna	Maximum length		
	Ant.-Post. diameter at midshaft		
	Med.-Lat. diameter at midshaft		
Sacrum	Anterior length		
	Anterior superior breadth	50mm	
	Maximum transverse diameter of base		
Femur	Maximum length		442mm
	Epicondylar length		73mm
	Maximum diameter of the femoral head	43mm	44mm
Tibia	Length		
	Maximum proximal epiphyseal breadth	67mm	
	Maximum distal epiphyseal breadth		
Fibula	Maximum length		

Individual Y

Skeletal Analysis

A-number:	A.4994y
T-number:	
Site:	Sandvika, Jøa

Notes (e.g. pathology, cutmarks):
Comingled remains

Skeletal inventory

x = present

· = not present

Cranial bones and joint surfaces

	L	R
Frontal		
Parietal		
Occipital		
Temporal		
TMJ		

	L	R
Sphenoid		
Zygomatic		
Maxilla		
Palatine		
Mandible		

Postcranial bones and joint surfaces

	L	R
Clavicle		
Scapula		
Body		
Glenoid f.		
Patella		
Sacrum	x	x

	L	R
Os coxae	x	x
Ilium	x	x
Ishium		
Pubis		
Acetabulum	x	x
Auric. surface	x	x

Vertebrae		
	Centrum	Neural arch
C1		
C2		
C7		
T10		
T11		
T12		
L1		
L2		
L3		
L4		
L5		
# present/# complete		
C3-6		
T1-T9		

Ribs (individual)		
	L	R
1st		
2nd		
11th		
12th		

Ribs (3-10)		
# present/# complete		
L	R	Unsided

Sternum	
Manubrium	
Body	

			Diaphysis			
	Side	Proximal epiphysis	Proximal third	Middle third	Distal third	Distal epiphysis
Humerus	Left					
Humerus	Right					
Radius	Left					
Radius	Right					
Ulna	Left					
Ulna	Right					
Femur	Left	x	x	x	x	x
Femur	Right	x	x	x	x	x
Tibia	Left	x	x	x	x	x
Tibia	Right	x	x	x	x	x
Fibula	Left					
Fibula	Right					

Hand/foot elements

Talus	Left		Calcaneus	Left	
Talus	Right		Calcaneus	Right	

	# present/# complete		
	L	R	Unsided
Carpals			
Metacarpal			
Phalanges (hand)			
Tarsals			
Metatarsal			
Phalanges (foot)			

Notes

Age-at-death/sex indicators

Sex

Pelvis	L	R
Ventral arc (1-3)[a]		
Subpubic concavity (1-3)[a]		
Ischiopubic ramus (1-3)[a]		
Greater sciatic notch (1-5)[c]	2	2
Preauricular sulcus (0-4)[b]	1	0
Composite Arc	1	1

Estimated sex, pelvis (1-5)[c] 1

Skull	L	M	R
Nuchal crest (1-5)[c]			
Mastoid process (1-5)[c]			
Supraorbital margin (1-5)[c]			
Glabella (1-5)[c]			
Mental eminence (1-5)[c]			

Estimated sex, skull (1-5)[c] _____

Age

Pubic symphysis	L	R
Todd (1-10)[d]		
Suchey-Brooks (1-6)[d]		
Auricular surface (1-8)[d]	2-4	2-4

Estimated age 25-40

a. 1 = female
2 = indeterminate
3 = male

b. 0 = absent
1 = maximum expression
4 = minimum expression

c. 1 = definite female
2 = probable female
3 = indeterminate
4 = probable male
5 = definite male

d. See Buikstra & Ubelaker 1994 for age groups

Postcranial measurements

		L	R
Clavicle	Maximum length		
	Ant.-Post. diameter at midshaft		
	Sup.-Inf. diameter at midshaft		
Humerus	Maximum length		
	Epicondylar breadth		
	Vertical diameter of head		
Radius	Maximum length		
	Ant.-Post. diameter at midshaft		
	Med.-Lat. diameter at midshaft		
Ulna	Maximum length		
	Ant.-Post. diameter at midshaft		
	Med.-Lat. diameter at midshaft		
Sacrum	Anterior length		
	Anterior superior breadth		
	Maximum transverse diameter of base		
Femur	Maximum length	420mm	416mm
	Epicondylar length	73mm	73mm
	Maximum diameter of the femoral head	40mm	41mm
Tibia	Length	351mm	350mm
	Maximum proximal epiphyseal breadth	69mm	70mm
	Maximum distal epiphyseal breadth	39mm	44mm
Fibula	Maximum length		

Extra info

T18645:002 A4994 grave II + III

2 individuals

1 vertebra, arms, and skull: cannot determine which individual they belong to

Room for error in how they have been put together

1 left tibia probably belongs to individual X; however, due to missing distal epiphysis on femur this cannot be tested or confirmed

1 lumbar vert. (possibly matched with sacrum of Y)

1 fibula R: 342 mm

1 ulna R

1 ulna L

The two ulnas look like they come from two different individuals. Distal ends not preserved.

2 humeri R: the distal end is not preserved on 1 (possibly belonging to individual Y), both are broken at the midshaft

1 humerus: probably Y

Head: 40mm

1 humerus: probably X

Head: 42 mm

Epi. Mid.: 57 mm

1 cranium + 1 tooth in mandible

Mand. Ramus: 3

M1 tooth (wear outwards)

Mastoid: 3

Nuchal crest: 1

Mandible may not belong to cranium. Look like young individuals so sexual traits may not be fully present yet.

A4995, Grave IX

Skeletal Analysis

A-number:	A.4995
T-number:	T.28748
Site:	Sandvika, Jøa

Notes (e.g. pathology, cutmarks):

Left tibia: taphonomy, possible underlying condition

Long bones

			Diaphysis			
	Side	Proximal epiphysis	Proximal third	Middle third	Distal third	Distal epiphysis
Humerus	Left					
Humerus	Right					
Radius	Left	x	x	x		
Radius	Right					
Ulna	Left	x	x	x		
Ulna	Right					
Femur	Left					
Femur	Right					
Tibia	Left	x	x	x	x	x
Tibia	Right		x	x	x	x
Fibula	Left		x	x	x	x
Fibula	Right		x	x	x	x

Hand/foot elements

Talus	Left	x	Calcaneus	Left	x
Talus	Right	x	Calcaneus	Right	

	# present/# complete		
	L	R	Unsided
Carpals			
Metacarpals			
Phalanges (hand)			
Tarsals	2/2	2/2	2/2
Metatarsals			5/5
Phalanges (foot)			

Notes

Postcranial measurements

		L	R
Clavicle	Maximum length		
	Ant.-Post. diameter at midshaft		
	Sup.-Inf. diameter at midshaft		
Humerus	Maximum length		
	Epicondylar breadth		
	Vertical diameter of head		
Radius	Maximum length		
	Ant.-Post. diameter at midshaft		
	Med.-Lat. diameter at midshaft		
Ulna	Maximum length		
	Ant.-Post. diameter at midshaft		
	Med.-Lat. diameter at midshaft		
Sacrum	Maximum transverse diameter of base		
Femur	Maximum length		
	Epicondylar length		
	Maximum diameter of the femoral head		
Tibia	Length	322mm	
	Maximum proximal epiphyseal breadth		
	Maximum distal epiphyseal breadth	47mm	
Fibula	Maximum length		
	Maximum diameter at midshaft		

A995b, Grave VII

Skeletal Analysis

A-number:	A.4995b
	T.18648:d
T-number:	/004
	Sandvika,
Site:	Jøa

Notes (e.g. pathology, cutmarks):

Skeletal inventory

x = present

- = not present

Cranial bones and joint surfaces

	L	R
Frontal	x	
Parietal	x	
Occipital	x	
Temporal	x	
TMJ		

	L	R
Sphenoid	x	
Zygomatic		x
Maxilla		x
Palatine		
Mandible		

Postcranial bones and joint surfaces

	L	R
Clavicle		
Scapula		
Body		
Glenoid f.		
Patella		
Sacrum		

	L	R
Os coxae		
Ilium		
Ishium		
Pubis		
Acetabulum		
Auric. surface		

Vertebrae		
	Centrum	Neural arch
C1		
C2		
C7		
T10		
T11		
T12		
L1		
L2		
L3		
L4		
L5		
# present/# complete		
C3-6		
T1-T9		

Ribs (individual)		
	L	R
1st		
2nd		
11th		
12th		

Ribs (3-10)		
# present/# complete		
L	R	Unsided

Sternum	
Manubrium	
Body	

Long bones

			Diaphysis			
	Side	Proximal epiphysis	Proximal third	Middle third	Distal third	Distal epiphysis
Humerus	Left					
Humerus	Right					
Radius	Left					
Radius	Right					
Ulna	Left					
Ulna	Right					
Femur	Left					
Femur	Right					
Tibia	Left					
Tibia	Right					
Fibula	Left					
Fibula	Right					

Hand/foot elements

Talus	Left		Calcaneus	Left	
Talus	Right		Calcaneus	Right	

	# present/# complete		
	L	R	Unsided
Carpals			
Metacarpals			
Phalanges (hand)			
Tarsals			
Metatarsals			
Phalanges (foot)			

Notes

Age-at-death/sex indicators

Sex

Pelvis	L	R
Ventral arc (1-3)[a]		
Subpubic concavity (1-3)[a]		
Ischiopubic ramus (1-3)[a]		
Greater sciatic notch (1-5)[c]		
Preauricular sulcus (0-4)[b]		

Estimated sex, pelvis (1-5)[c] _____

Skull	L	M	R
Nuchal crest (1-5)[c]		1	
Mastoid process (1-5)[c]	3		-
Supraorbital margin (1-5)[c]	3-4		3-4
Glabella (1-5)[c]	4		4
Mental eminence (1-5)[c]			

Estimated sex, skull (1-5)[c] 4

Age

Pubic symphysis	L	R
Todd (1-10)[d]		
Suchey-Brooks (1-6)[d]		
Auricular surface (1-8)[d]		

Estimated age _____

a. 1 = female
2 = indeterminate
3 = male

b. 0 = absent
1 = maximum expression
4 = minimum expression

c. 1 = definite female
2 = probable female
3 = indeterminate
4 = probable male
5 = definite male

d. See Buikstra & Ubelaker 1994 for age groups

Dental inventory recording form: development, wear, and pathology (permanent teeth)

	Tooth		Presence	Development	Wear		Total wear	Caries			Abscess	Calculus/affected surface
Maxillary Right	1	M^3										
	2	M^2										
	3	M^1	2		8 8	9 9	Angled wear inward					
	4	P^2										
	5	P^1										
	6	C										
	7	I^2										
	8	I^1										
Maxillary Left	9	I^1										
	10	I^2										
	11	C										
	12	P^1										
	13	P^2										
	14	M^1										
	15	M^2										
	16	M^3										
Mandibular Left	17	M_3										
	18	M_2										
	19	M_1										

A7439, Grave VII

Skeletal Analysis

A-number:	A.7439
	T.18648:c
T-number:	/003
	Sandvika,
Site:	Jøa

Notes (e.g. pathology, cutmarks):

Possible pathology/taphonomy on proximal and distal radial epiphyses
Humeral proximal epiphysis wear

Long bones

			Diaphysis			
	Side	**Proximal epiphysis**	**Proximal third**	**Middle third**	**Distal third**	**Distal epiphysis**
Humerus	Left					
Humerus	Right	x	x	x	x	x
Radius	Left					
Radius	Right	x	x	x	x	x
Ulna	Left					
Ulna	Right	x	x	x	x	x
Femur	Left					
Femur	Right					
Tibia	Left					
Tibia	Right					
Fibula	Left					
Fibula	Right					

Hand/foot elements

Talus	Left		Calcaneus	Left	
Talus	Right		Calcaneus	Right	

	# present/# complete		
	L	**R**	**Unsided**
Carpals			
Metacarpals			
Phalanges (hand)			
Tarsals			
Metatarsals			
Phalanges (foot)			

Notes

Postcranial measurements

		L	R
Clavicle	Maximum length		
	Ant.-Post. diameter at midshaft		
	Sup.-Inf. diameter at midshaft		
Humerus	Maximum length		313mm
	Epicondylar breadth		57mm
	Vertical diameter of head		43mm
Radius	Maximum length		224mm
	Ant.-Post. diameter at midshaft		14mm
	Med.-Lat. diameter at midshaft		
Ulna	Maximum length		249mm
	Ant.-Post. diameter at midshaft		17mm
	Med.-Lat. diameter at midshaft		
Sacrum	Maximum transverse diameter of base		
Femur	Maximum length		
	Epicondylar length		
	Maximum diameter of the femoral head		
Tibia	Length		
	Maximum proximal epiphyseal breadth		
	Maximum distal epiphyseal breadth		
Fibula	Maximum length		
	Maximum diameter at midshaft		

A7440, Grave X

Skeletal Analysis

A-number:	A.7440
	T18649:0
T-number:	11
	Sandvika,
Site:	Jøa

Notes (e.g. pathology, cutmarks):

Pathology on the left radius on the distal 1/3 of the diaphysis
Pathology on cervical vertebra, bony growth on the left articulating facet
Cribra orbitalis in the right orbit

Skeletal inventory

x = present

- = not present

Cranial bones and joint surfaces

	L	R
Frontal	x	x
Parietal		
Occipital		
Temporal		
TMJ		

	L	R
Sphenoid		
Zygomatic		
Maxilla	x	
Palatine		
Mandible	x	x

Postcranial bones and joint surfaces

	L	R
Clavicle		
Scapula		
Body		
Glenoid f.		
Patella		
Sacrum		

	L	R
Os coxae		
Ilium		
Ishium		
Pubis		
Acetabulum		
Auric. surface		

Vertebrae		
	Centrum	Neural arch
C1		
C2	x	x
C7		
T10		
T11		
T12		
L1		
L2		
L3		
L4		
L5		
# present/# complete		
C3-6	2/2	2/1
T1-T9		

Ribs (individual)		
	L	R
1st		
2nd		
11th		
12th		

Ribs (3-10)		
# present/# complete		
L	R	Unsided

Sternum	
Manubrium	
Body	

Long bones

			Diaphysis			
	Side	Proximal epiphysis	Proximal third	Middle third	Distal third	Distal epiphysis
Humerus	Left	x	x	x	x	x
Humerus	Right					
Radius	Left	x	x	x	x	x
Radius	Right					
Ulna	Left	x	x	x	x	x
Ulna	Right					
Femur	Left	x	x		x	x
Femur	Right					
Tibia	Left	x	x	x	x	x
Tibia	Right					
Fibula	Left					
Fibula	Right					

Hand/foot elements

Talus	Left		Calcaneus	Left	
Talus	Right		Calcaneus	Right	

	# present/# complete		
	L	R	Unsided
Carpals			
Metacarpals			
Phalanges (hand)			
Tarsals			
Metatarsals			
Phalanges (foot)			

Notes

Age-at-death/sex indicators

Sex

Pelvis	L	R
Ventral arc (1-3)[a]		
Subpubic concavity (1-3)[a]		
Ischiopubic ramus (1-3)[a]		
Greater sciatic notch (1-5)[c]		
Preauricular sulcus (0-4)[b]		

Estimated sex, pelvis (1-5)[c] _____

Skull	L	M	R
Nuchal crest (1-5)[c]			
Mastoid process (1-5)[c]	1		
Supraorbital margin (1-5)[c]			4
Glabella (1-5)[c]	1		1
Mental eminence (1-5)[c]		2	
Mental ramus (1-5)c			

Estimated sex, skull (1-5)[c] 1

Age

Pubic symphysis	L	R
Todd (1-10)[d]		
Suchey-Brooks (1-6)[d]		
Auricular surface (1-8)[d]		
Clavicle		

Estimated age _____

a. 1 = female
2 = indeterminate
3 = male

b. 0 = absent
1 = maximum expression
4 = minimum expression

c. 1 = definite female
2 = probable female
3 = indeterminate
4 = probable male
5 = definite male

d. See Buikstra & Ubelaker 1994 for age groups

Dental inventory recording form: development, wear, and pathology (permanent teeth)

	Tooth		Presence	Development	Wear		Total wear	Caries			Abscess	Calculus/affected surface
Maxillary Right	1	M^3										
	2	M^2										
	3	M^1										
	4	P^2										
	5	P^1										
	6	C										
	7	I^2										
	8	I^1										
Maxillary Left	9	I^1										
	10	I^2										
	11	C										
	12	P^1										
	13	P^2										
	14	M^1										
	15	M^2										
	16	M^3										
Mandibular Left	17	M_3	2		8 8	8 9						
	18	M_2										
	19	M_1										

	Tooth		Presence	Development	Wear		Total wear	Caries			Abscess	Calculus/affected surface
Mandibular Left	20	P_2										
	21	P_1										
	22	C										
	23	I_2										
	24	I_1										
Mandibular Right	25	I_1										
	26	I_2										
	27	C										
	28	P_1										
	29	P_2										
	30	M_1									Abcess on the outside	
	31	M_2										
	32	M_3	2		9 9	9 9						

Estimated age (juveniles) _____
Estimated age (Brothwell) 35-45
Estimated age (Miles) 50-60

Supernumerary teeth

Position between teeth	Location (1-4)	Position between teeth	Location (1-4)	Position between teeth	Location (1-4)

Postcranial measurements

		L	R
Clavicle	Maximum length		
	Ant.-Post. diameter at midshaft		
	Sup.-Inf. diameter at midshaft		
Humerus	Maximum length		
	Epicondylar breadth	50mm	
	Vertical diameter of head		
Radius	Maximum length	243mm	
	Ant.-Post. diameter at midshaft		
	Med.-Lat. diameter at midshaft		
Ulna	Maximum length	267mm	
	Ant.-Post. diameter at midshaft		
	Med.-Lat. diameter at midshaft		
Sacrum	Maximum transverse diameter of base		
Femur	Maximum length		
	Epicondylar length	76mm	
	Maximum diameter of the femoral head	40mm	
Tibia	Length	357mm	
	Maximum proximal epiphyseal breadth		
	Maximum distal epiphyseal breadth	44mm	
Fibula	Maximum length		
	Maximum diameter at midshaft		

A7441, Grave XI

Skeletal Analysis

A-number: A.7441
T-number:
Site: Sandvika, Jøa

Notes (e.g. pathology, cutmarks):

All vertebrae kind of fit badly, possibly because of lack of soft tissue. The body fits well but not the neural arch
Young individual so sexual dimorphic traits are not as pronounced

Skeletal inventory

x = present

- = not present

Cranial bones and joint surfaces

	L	R
Frontal		
Parietal		
Occipital		
Temporal		
TMJ		

	L	R
Sphenoid		
Zygomatic		
Maxilla	x	x
Palatine	x	x
Mandible	x	x

Postcranial bones and joint surfaces

	L	R
Clavicle		
Scapula		
Body		
Glenoid f.		
Patella		
Sacrum	S1	S1

	L	R
Os coxae		
Ilium		
Ishium		
Pubis		
Acetabulum		
Auric. surface		

Vertebrae		
	Centrum	Neural arch
C1		
C2	x	x
C7		
T10		
T11		
T12		
L1	x	x
L2	x	x
L3		
L4	x	x
L5	x	x
# present/# complete		
C3-6		
T1-T9		

doubt

Ribs (individual)		
	L	R
1st		
2nd		
11th		
12th		

Ribs (3-10)		
# present/# complete		
L	R	Unsided

Sternum	
Manubrium	
Body	

Long bones

			Diaphysis			
	Side	**Proximal epiphysis**	**Proximal third**	**Middle third**	**Distal third**	**Distal epiphysis**
Humerus	Left	x	x	x	x	x
Humerus	Right					
Radius	Left					
Radius	Right					
Ulna	Left					
Ulna	Right					
Femur	Left					
Femur	Right	x	x	x	x	x
Tibia	Left					
Tibia	Right	x	x	x	x	x
Fibula	Left					
Fibula	Right					

Hand/foot elements

Talus	Left		Calcaneus	Left	
Talus	Right		Calcaneus	Right	

	# present/# complete		
	L	**R**	**Unsided**
Carpals			
Metacarpals			
Phalanges (hand)			
Tarsals			
Metatarsals			
Phalanges (foot)			

Notes

7 fragments from skull

At least 4 are parietal

Age-at-death/sex indicators

Sex

Pelvis	L	R
Ventral arc (1-3)[a]		
Subpubic concavity (1-3)[a]		
Ischiopubic ramus (1-3)[a]		
Greater sciatic notch (1-5)[c]		
Preauricular sulcus (0-4)[b]		

Estimated sex, pelvis (1-5)[c] _____

Skull	L	M	R
Nuchal crest (1-5)[c]		1	
Mastoid process (1-5)[c]			
Supraorbital margin (1-5)[c]	2		2
Glabella (1-5)[c]	2		1
Mental eminence (1-5)[c]		1	
Mandibular ramus			2-3

Estimated sex, skull (1-5)[c] 2

Age

Pubic symphysis	L	R	
Todd (1-10)[d]			
Suchey-Brooks (1-6)[d]			
Auricular surface (1-8)[d]			
Clavicle	unfused		early 20s

Estimated age early 20s

a. 1 = female
2 = indeterminate
3 = male

b. 0 = absent
1 = maximum expression
4 = minimum expression

c. 1 = definite female
2 = probable female
3 = indeterminate
4 = probable male
5 = definite male

d. See Buikstra & Ubelaker 1994 for age groups

Dental inventory recording form: development, wear, and pathology (permanent teeth)

	Tooth		Presence	Development	Wear		Total wear	Caries			Abscess	Calculus/affected surface
Maxillary Right	1	M^3										
	2	M^2										
	3	M^1										
	4	P^2										
	5	P^1										
	6	C										
	7	I^2										
	8	I^1										
Maxillary Left	9	I^1										
	10	I^2										
	11	C										
	12	P^1										
	13	P^2										
	14	M^1	2		6	5						
					5	5						
	15	M^2										
	16	M^3										
Mandibular Left	17	M_3	2		2	2						
					2	2						
	18	M_2	2		5	4						Enamel hypoplasia
					4	4						
	19	M_1	2		9	9						
					9	9						

	Tooth		Presence	Development	Wear		Total wear	Caries			Abscess	Calculus/affected surface
Mandibular Left	20	P_2	2		2	2						
	21	P_1										
	22	C										
	23	I_2	1		2	2						
	24	I_1										
Mandibular Right	25	I_1										
	26	I_2										
	27	C										
	28	P_1										
	29	P_2										
	30	M_1	2		5	6						
					5	6						
	31	M_2	1		5	5						
					4	4						
	32	M_3	1		3	3						
					3	3						

Estimated age (juveniles) _____

Estimated age (Brothwell) M2 + M3 = 17-25 | M1 = 25-35

Estimated age (Miles) 18 - 26

Supernumerary teeth

Position between teeth	Location (1-4)	Position between teeth	Location (1-4)	Position between teeth	Location (1-4)

Postcranial measurements

		L	R
Clavicle	Maximum length	138mm	
	Ant.-Post. diameter at midshaft		
	Sup.-Inf. diameter at midshaft		
Humerus	Maximum length	328mm	313mm
	Epicondylar breadth	57mm	58mm
	Vertical diameter of head	43mm	42mm
Radius	Maximum length	229mm	221mm
	Ant.-Post. diameter at midshaft		
	Med.-Lat. diameter at midshaft	16mm	15mm
Ulna	Maximum length		240mm
	Ant.-Post. diameter at midshaft		
	Med.-Lat. diameter at midshaft		18mm
Sacrum	Maximum transverse diameter of base	53mm	
Femur	Maximum length		423mm
	Epicondylar length		74mm
	Maximum diameter of the femoral head	42mm	44mm
Tibia	Length	363mm	365mm
	Maximum proximal epiphyseal breadth	65mm	66mm
	Maximum distal epiphyseal breadth	45mm	
Fibula	Maximum length		352mm
	Maximum diameter at midshaft		14mm

A7442, Grave XIII

Skeletal Analysis

A-number:	A.7442
	T.18651:
T-number:	b/002
	Sandvika.
Site:	Jøa

Notes (e.g. pathology, cutmarks):

Long bones

			Diaphysis			
	Side	**Proximal epiphysis**	**Proximal third**	**Middle third**	**Distal third**	**Distal epiphysis**
Humerus	Left	x	x	x	x	x
Humerus	Right					
Radius	Left	x	x	x	x	x
Radius	Right					
Ulna	Left	x	x	x	x	x
Ulna	Right					
Femur	Left					
Femur	Right					
Tibia	Left					
Tibia	Right					
Fibula	Left					
Fibula	Right					

Hand/foot elements

Talus	Left		Calcaneus	Left	
Talus	Right		Calcaneus	Right	

	# present/# complete		
	L	**R**	**Unsided**
Carpals			
Metacarpals			
Phalanges (hand)			
Tarsals			
Metatarsals			
Phalanges (foot)			

Notes

Postcranial measurements

		L	R
Clavicle	Maximum length		
	Ant.-Post. diameter at midshaft		
	Sup.-Inf. diameter at midshaft		
Humerus	Maximum length	304mm	
	Epicondylar breadth	58mm	
	Vertical diameter of head	42mm	
Radius	Maximum length	218mm	
	Ant.-Post. diameter at midshaft	16mm	
	Med.-Lat. diameter at midshaft		
Ulna	Maximum length	241mm	
	Ant.-Post. diameter at midshaft		
	Med.-Lat. diameter at midshaft	15mm	
Sacrum	Maximum transverse diameter of base		
Femur	Maximum length		
	Epicondylar length		
	Maximum diameter of the femoral head		
Tibia	Length		
	Maximum proximal epiphyseal breadth		
	Maximum distal epiphyseal breadth		
Fibula	Maximum length		
	Maximum diameter at midshaft		

A7443, Grave XIV

Two individuals, comingled remains

Individual x = has two ulnas in good condition

Individual y = one ulna, probable pathology present

Bones that cannot be identified to one individual or the other

Sacrum (near complete)

- Base width (55mm)

C7, T1, T2, T10, T11, T12, L1, L2, L3, L4, L5

3 thoracic (possibly T7, T8, T9)

Pathology on L5, thinning of walls

Complete misfit to sacrum, L5 is larger at the base (sacrum and spine belong to different individuals)

L femur (4 parts)

- Femoral head (41mm)
- Epicondylar width (76mm)

R femur (2 parts)

- Femoral head (45mm)

R tibia (1 fragment)

L tibia (1 fragment

L humerus (proximal epiphysis missing)

- Epicondylar width (61mm)

L ulna (complete, green staining)

- Length (251mm)
- Midshaft med. – lat. (17mm)

R ulna (fragmented proximally and distally)

- Midshaft med. – lat. (18mm)

L radius (distally fragmented, green staining)

- Midshaft med. – lat. (16mm)

(probable) L ulna (pathology seems present, smaller than the other ulnas)

- Midshaft med. – lat. (13mm)

2 mandibles with different wear patterns

Cranium A (in bag)

- Part of occipital and part of temporal (L) (based on thickness, weight, colour and preservation these most likely belong to the mandible in the box)
- Mandible
  - L: M3, M1, PM2, C, I2 (in occlusion) PM1, M2 (present but not in occlusion)
  - R: M1, PM2, PM1, C (in occlusion) I2, M3, M2 (present but not in occlusion)
  - M1(L) eroded all the way to the root, probable infection
  - Extreme calculus on anterior teeth
- Maxilla (3 fragments)
  - L: M2, M1, C (in occlusion) PM1, PM2 (present but not in occlusion)
  - R: M2, PM2, PM1, C (in occlusion) M3, M1, I2 (present but not in occlusion)
  - M2(L) cavity erosion between root and crown towards M3
- Sexing
  - Mandible
    - Mandibular ramus = 2
    - Mental eminence = 3
    - Broad jawline
  - Temporal
    - Mastoid process = 1
- Ageing
  - Brothwell = 25-35
  - Miles = 25-45

	Tooth		Presence	Wear		Notes
Maxillary Right	1	M^3	1	3	5	
				3	5	
	2	M^2	2	5	7	
				5	7	
	3	M^1	1	9	9	
				9	9	
	4	P^2	2	5	5	
	5	P^1	2	4	4	
	6	C	2	3	3	
	7	I^2	1	4	4	
	8	I^1				

Maxillary Left	9	I^1				
	10	I^2				
	11	C	2	5	5	
	12	P^1	1	5	5	
	13	P^2	1	5	5	
	14	M^1	2	8	5	
				8	5	
	15	M^2	2	5	4	
				5	4	
	16	M^3				
Mandibular Left	17	M_3	2	4	3	
				3	3	
	18	M_2	1	8	8	Enamel hypoplasia
				8	8	
	19	M_1	2	10	10	
				10	10	
	20	P_2	2	3	3	
	21	P_1	1	4	3	
	22	C	2		2	Tooth partially broken (post-mortem?)
	23	I_2	2	4	4	
	24	I_1				
Mandibular Right	25	I_1				
	26	I_2	1	4	4	
	27	C	2	5	5	
	28	P_1	2	2	2	
	29	P_2	2	2	3	
	30	M_1	2	7	8	
				7	8	
	31	M_2	1	5	6	
				5	5	
	32	M_3	1	5	5	
				3	3	

Cranium B (in box)

- Phalanx (intermediate), Part of the hyoid
- Part of temporal bone (L) (based on thickness, weight, colour and preservation this most likely belongs to the mandible in the bag)
- Mandible
    - L: M2, M1, PM2 just root (in occlusion) C, PM1, PM2 crown (present but not in occlusion)

- R: M2, M1, PM2, PM1, C, I2, I1 (present but not in occlusion
- No sign of M3, all permanent teeth, little wear on M2, but quite a lot of wear on premolars

- Sexing
  - Mandible
    - Mandibular ramus = 2-3
    - Mental eminence = 3
  - Temporal
    - Mastoid process = 2
- Ageing
  - Brothwell = 17 – 25
  - Miles = 18 – 24
  - Note: Significant wear on premolars compared to molars. Possible that maxilla just doesn't quite reach down (overbite?). Probably older than molars would suggest according to Brothwell and Miles.

	Tooth		Presence	Wear		Notes
Maxillary Right	1	M^3				
	2	M^2				
	3	M^1				
	4	P^2				
	5	P^1				
	6	C				
	7	I^2				
	8	I^1				
Maxillary Left	9	I^1				
	10	I^2				
	11	C				
	12	P^1				
	13	P^2				
	14	M^1				
	15	M^2				
	16	M^3				
Mandibular Left	17	M_3	6			No M3, most likely born without.
	18	M_2	2	3	3	
				3	3	

	19	M_1	2	5	5	
				5	4	
	20	P_2	2			Broken, crown is present but loose
	21	P_1	2	4	4	
	22	C	2	4	4	
	23	I_2				
	24	I_1				
Mandibular Right	25	I_1	1	4	4	
	26	I_2	1	4	4	
	27	C	1	5	5	
	28	P_1	1	5	5	
	29	P_2	1	4	4	
	30	M_1	1	4	5	
				4	5	
	31	M_2	1	3	3	
				3	3	
	32	M_3	6			No M3, most likely born without.

A7444, Grave XV

Skeletal Analysis

A-number:	A.7444
	T.18653:c
T-number:	/004
	Sandvika,
Site:	Jøa

Notes (e.g. pathology, cutmarks):

Thoracic vertebrae with osteophytes indicate an older individual

Skeletal inventory

x = present
- = not present

Cranial bones and joint surfaces

	L	R
Frontal		
Parietal	x	x
Occipital	x	x
Temporal		
TMJ		

	L	R
Sphenoid		
Zygomatic		
Maxilla		
Palatine		
Mandible		

Postcranial bones and joint surfaces

	L	R
Clavicle		
Scapula		
Body		
Glenoid f.		
Patella		
Sacrum		

	L	R
Os coxae		
Ilium		
Ishium		
Pubis		
Acetabulum		
Auric. surface		

Vertebrae		
	Centrum	Neural arch
C1	x	x
C2		
C7	x	x
T10		
T11		
T12		
L1		
L2		
L3		
L4		
L5		
# present/# complete		
C3-6	1/1	1/1
T1-T9	1/1	1/1

Ribs (individual)		
	L	R
1st		
2nd		
11th		
12th		

Ribs (3-10)		
# present/# complete		
L	R	Unsided

Sternum	
Manubrium	
Body	

Long bones

			Diaphysis			
	Side	Proximal epiphysis	Proximal third	Middle third	Distal third	Distal epiphysis
Humerus	Left					
Humerus	Right					
Radius	Left					
Radius	Right					
Ulna	Left					
Ulna	Right?		x			
Femur	Left					
Femur	Right	x	x			
Tibia	Left					
Tibia	Right					
Fibula	Left					
Fibula	Right					

Hand/foot elements

Talus	Left		Calcaneus	Left	
Talus	Right		Calcaneus	Right	

	# present/# complete		
	L	R	Unsided
Carpals			
Metacarpals			
Phalanges (hand)			
Tarsals			
Metatarsals			
Phalanges (foot)			

Notes

Min. 5 parietal bone fragments

Age-at-death/sex indicators

Sex

Pelvis	L	R
Ventral arc (1-3)[a]		
Subpubic concavity (1-3)[a]		
Ischiopubic ramus (1-3)[a]		
Greater sciatic notch (1-5)[c]		
Preauricular sulcus (0-4)[b]		

Estimated sex, pelvis (1-5)[c] _____

Skull	L	M	R
Nuchal crest (1-5)[c]		4	
Mastoid process (1-5)[c]			
Supraorbital margin (1-5)[c]			
Glabella (1-5)[c]	1		1
Mental eminence (1-5)[c]			

Estimated sex, skull (1-5)[c] 3

Age

Pubic symphysis	L	R
Todd (1-10)[d]		
Suchey-Brooks (1-6)[d]		
Auricular surface (1-8)[d]		

Estimated age _____

a. 1 = female
2 = indeterminate
3 = male

b. 0 = absent
1 = maximum expression
4 = minimum expression

c. 1 = definite female
2 = probable female
3 = indeterminate
4 = probable male
5 = definite male

d. See Buikstra & Ubelaker 1994 for age groups

Postcranial measurements

		L	R
Clavicle	Maximum length		
	Ant.-Post. diameter at midshaft		
	Sup.-Inf. diameter at midshaft		
Humerus	Maximum length		
	Epicondylar breadth		
	Vertical diameter of head		
Radius	Maximum length		
	Ant.-Post. diameter at midshaft		
	Med.-Lat. diameter at midshaft		
Ulna	Maximum length		
	Ant.-Post. diameter at midshaft		
	Med.-Lat. diameter at midshaft		
Sacrum	Maximum transverse diameter of base		
Femur	Maximum length		
	Epicondylar length		
	Maximum diameter of the femoral head		41mm
Tibia	Length		
	Maximum proximal epiphyseal breadth		
	Maximum distal epiphyseal breadth		
Fibula	Maximum length		
	Maximum diameter at midshaft		

A7445, Grave XVI

Skeletal Analysis

A-number:	A.7445
T-number:	T.18654
Site:	Sandvika, Jøa

Notes (e.g. pathology, cutmarks):

Skeletal inventory

x = present

- = not present

Cranial bones and joint surfaces

	L	R
Frontal	x	x
Parietal		
Occipital		
Temporal		
TMJ		

	L	R
Sphenoid		
Zygomatic		
Maxilla		
Palatine		
Mandible		

Postcranial bones and joint surfaces

	L	R
Clavicle		
Scapula		
Body		
Glenoid f.		
Patella		
Sacrum		

	L	R
Os coxae		
Ilium		
Ishium		
Pubis		
Acetabulum		
Auric. surface		

Vertebrae		
	Centrum	Neural arch
C1		
C2		
C7		
T10		
T11		
T12		
L1		
L2		
L3		
L4		
L5		
# present/# complete		
C3-6		
T1-T9		

Ribs (individual)		
	L	R
1st		
2nd		
11th		
12th		

Ribs (3-10)		
# present/# complete		
L	R	Unsided

Sternum	
Manubrium	
Body	

Long bones

			Diaphysis			
	Side	Proximal epiphysis	Proximal third	Middle third	Distal third	Distal epiphysis
Humerus	Left					
Humerus	Right					
Radius	Left					
Radius	Right					
Ulna	Left					
Ulna	Right					
Femur	Left					
Femur	Right					
Tibia	Left					
Tibia	Right					
Fibula	Left					
Fibula	Right					

Hand/foot elements

Talus	Left	
Talus	Right	

Calcaneus	Left	
Calcaneus	Right	

	# present/# complete		
	L	R	Unsided
Carpals			
Metacarpals			
Phalanges (hand)			
Tarsals			
Metatarsals			
Phalanges (foot)			

Notes

4 unidentified skull bones

Age-at-death/sex indicators

Sex

Pelvis	L	R
Ventral arc (1-3)[a]		
Subpubic concavity (1-3)[a]		
Ischiopubic ramus (1-3)[a]		
Greater sciatic notch (1-5)[c]		
Preauricular sulcus (0-4)[b]		

Estimated sex, pelvis (1-5)[c] _____

Skull	L	M	R
Nuchal crest (1-5)[c]			
Mastoid process (1-5)[c]			
Supraorbital margin (1-5)[c]	2		2
Glabella (1-5)[c]	3		3
Mental eminence (1-5)[c]			

Estimated sex, skull (1-5)[c] 3

Age

Pubic symphysis	L	R
Todd (1-10)[d]		
Suchey-Brooks (1-6)[d]		
Auricular surface (1-8)[d]		

Estimated age _____

a. 1 = female
2 = indeterminate
3 = male

b. 0 = absent
1 = maximum expression
4 = minimum expression

c. 1 = definite female
2 = probable female
3 = indeterminate
4 = probable male
5 = definite male

d. See Buikstra & Ubelaker 1994 for age groups

A7446, Grave XIb

Skeletal Analysis

A-number: A7446
T-number:
Site: Sandvika, Jøa

Notes (e.g. pathology, cutmarks):

Ossification of the muscle attachment on the femur
3x M3, 2x M2 (maxilla), 2x M1 (maxilla), 7x anterior unidentified teeth, in addition to the teeth that fit into the mandible and the maxilla
Possible comingling of teeth

Skeletal inventory

x = present

- = not present

Cranial bones and joint surfaces

	L	R
Frontal		
Parietal		
Occipital		
Temporal		
TMJ		

	L	R
Sphenoid		
Zygomatic		
Maxilla		
Palatine		
Mandible	x	x

Postcranial bones and joint surfaces

	L	R
Clavicle		
Scapula		
Body		
Glenoid f.		
Patella		
Sacrum	x	x

	L	R
Os coxae		
Ilium		
Ishium		
Pubis		
Acetabulum		
Auric. surface		

Vertebrae		
	Centrum	Neural arch
C1		
C2		
C7		
T10	x	x
T11	x	x
T12	x	x
L1	x	x
L2	x	x
L3	x	x
L4	x	x
L5	x	-
# present/# complete		
C3-6		
T1-T9	3/3	3/3

Ribs (individual)		
	L	R
1st		
2nd		
11th		
12th		

Ribs (3-10)		
# present/# complete		
L	R	Unsided

Sternum	
Manubrium	
Body	

Long bones

			Diaphysis			
	Side	**Proximal epiphysis**	**Proximal third**	**Middle third**	**Distal third**	**Distal epiphysis**
Humerus	Left					
Humerus	Right	x	x	x	x	x
Radius	Left					
Radius	Right	x	x	x	x	x
Ulna	Left					
Ulna	Right	x	x	x	x	x
Femur	Left					
Femur	Right	x	x	x	x	x
Tibia	Left					
Tibia	Right	x	x	x	x	x
Fibula	Left					
Fibula	Right	x	x	x	x	x

Hand/foot elements

Talus	Left		Calcaneus	Left	
Talus	Right		Calcaneus	Right	

	# present/# complete		
	L	**R**	**Unsided**
Carpals			
Metacarpals			
Phalanges (hand)			
Tarsals			
Metatarsals			
Phalanges (foot)			

Notes

Age-at-death/sex indicators

Sex

Pelvis	L	R
Ventral arc (1-3)[a]		
Subpubic concavity (1-3)[a]		
Ischiopubic ramus (1-3)[a]		
Greater sciatic notch (1-5)[c]		
Preauricular sulcus (0-4)[b]		

Estimated sex, pelvis (1-5)[c] _____

Skull	L	M	R
Nuchal crest (1-5)[c]			
Mastoid process (1-5)[c]			
Supraorbital margin (1-5)[c]			
Glabella (1-5)[c]			
Mental eminence (1-5)[c]		2	
Mandibular ramus (1-5)c	2		2

Estimated sex, skull (1-5)[c] 2

Age

Pubic symphysis	L	R
Todd (1-10)[d]		
Suchey-Brooks (1-6)[d]		
Auricular surface (1-8)[d]		
Clavicle		

Estimated age _____

a. 1 = female
2 = indeterminate
3 = male

b. 0 = absent
1 = maximum expression
4 = minimum expression

c. 1 = definite female
2 = probable female
3 = indeterminate
4 = probable male
5 = definite male

d. See Buikstra & Ubelaker 1994 for age groups

Dental inventory recording form: development, wear, and pathology (permanent teeth)

	Tooth		Presence	Development	Wear		Total wear	Caries			Abscess	Calculus/affected surface
Maxillary Right	1	M^3										
	2	M^2										
	3	M^1										
	4	P^2										
	5	P^1	1		2	2						
	6	C	1		2	2						
	7	I^2	1		2	2						
	8	I^1										
Maxillary Left	9	I^1										
	10	I^2										
	11	C										
	12	P^1										
	13	P^2										
	14	M^1										
	15	M^2										
	16	M^3										
Mandibular Left	17	M_3										
	18	M_2	1		3	3						
					3	3						
	19	M_1	2		3	3						
					3	3						

	Tooth		Presence	Development	Wear		Total wear	Caries			Abscess	Calculus/affected surface
Mandibular Left	20	P_2										
	21	P_1	1		2	2						
	22	C										
	23	I_2	1		3	3						
	24	I_1	1		2	2						
Mandibular Right	25	I_1	1		2	2						
	26	I_2	1		2	2						
	27	C	2		2	2						
	28	P_1	1		2	2						
	29	P_2	1		2	2						
	30	M_1	2		3	3						Enamel hypoplasia (on several other teeth as well)
					3	3						
	31	M_2	1		3	3						
					3	3						
	32	M_3										

Estimated age (juveniles)
Estimated age (Brothwell) 17-25
Estimated age (Miles) 16-22

Supernumerary teeth

Position between teeth	Location (1-4)	Position between teeth	Location (1-4)	Position between teeth	Location (1-4)

Postcranial measurements

		L	R
Clavicle	Maximum length		
	Ant.-Post. diameter at midshaft		
	Sup.-Inf. diameter at midshaft		
Humerus	Maximum length		290mm
	Epicondylar breadth		52mm
	Vertical diameter of head		40mm
Radius	Maximum length		217mm
	Ant.-Post. diameter at midshaft		
	Med.-Lat. diameter at midshaft		14mm
Ulna	Maximum length		237mm
	Ant.-Post. diameter at midshaft		
	Med.-Lat. diameter at midshaft		14mm
Sacrum	Maximum transverse diameter of base	54mm	
Femur	Maximum length		384mm
	Epicondylar length		
	Maximum diameter of the femoral head		41mm
Tibia	Length		316mm
	Maximum proximal epiphyseal breadth		65mm
	Maximum distal epiphyseal breadth		43mm
Fibula	Maximum length		307mm
	Maximum diameter at midshaft		15mm

Appendix B - Pictures of skeletal remains

This appendix includes the overview pictures of the remains, some whilst the remains were still in their packing boxes and some after they had been taken out of the boxes.

A4991 (Grave I-IV) and A4992 (Grave II)

Box containing A4991 and A4992.

A4995 (Grave IX), A7442 (Grave XIII), A 7444 (Grave XV), A7445 (Grave XVI)

Box containing A4995, A7442, A7444 and A7445.

A4994, Grave II-III

Individual X

Pelvis from A4994.

Individual Y

Pelvis from A4994.

Other elements

The two pelvises shown above a long with the other elements from A4994.

A4995, Grave IX

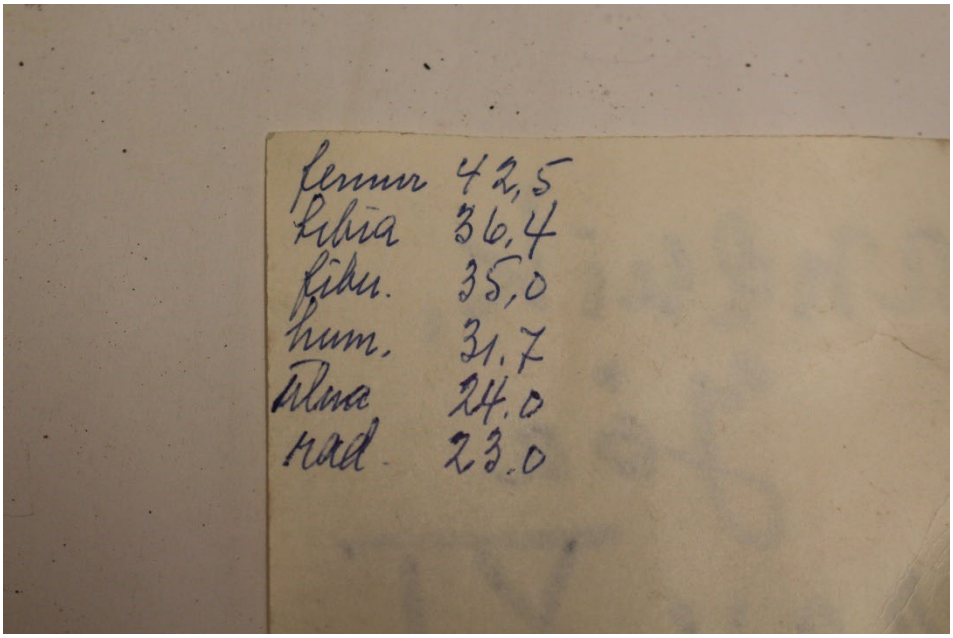
Five metatarsals from A4995 which were not sided.

The other elements from A4995.

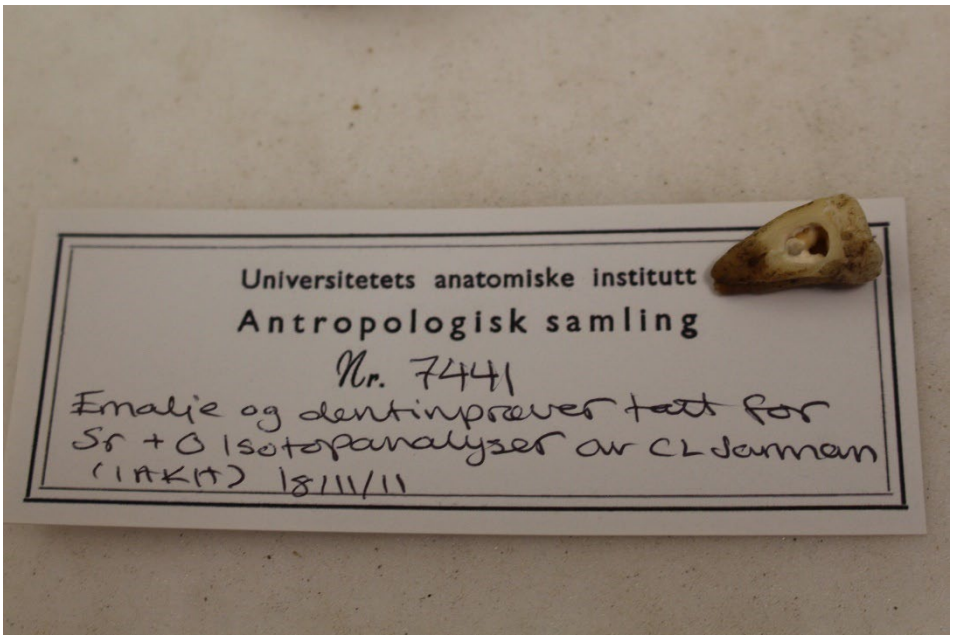
A7441, Grave XI

Box containing remains A7441.

Note in box A7441 with some skeletal elements and a number. Unknown what this note means.



Note in box with information about sample taken from tooth.



A7442, Grave XIII

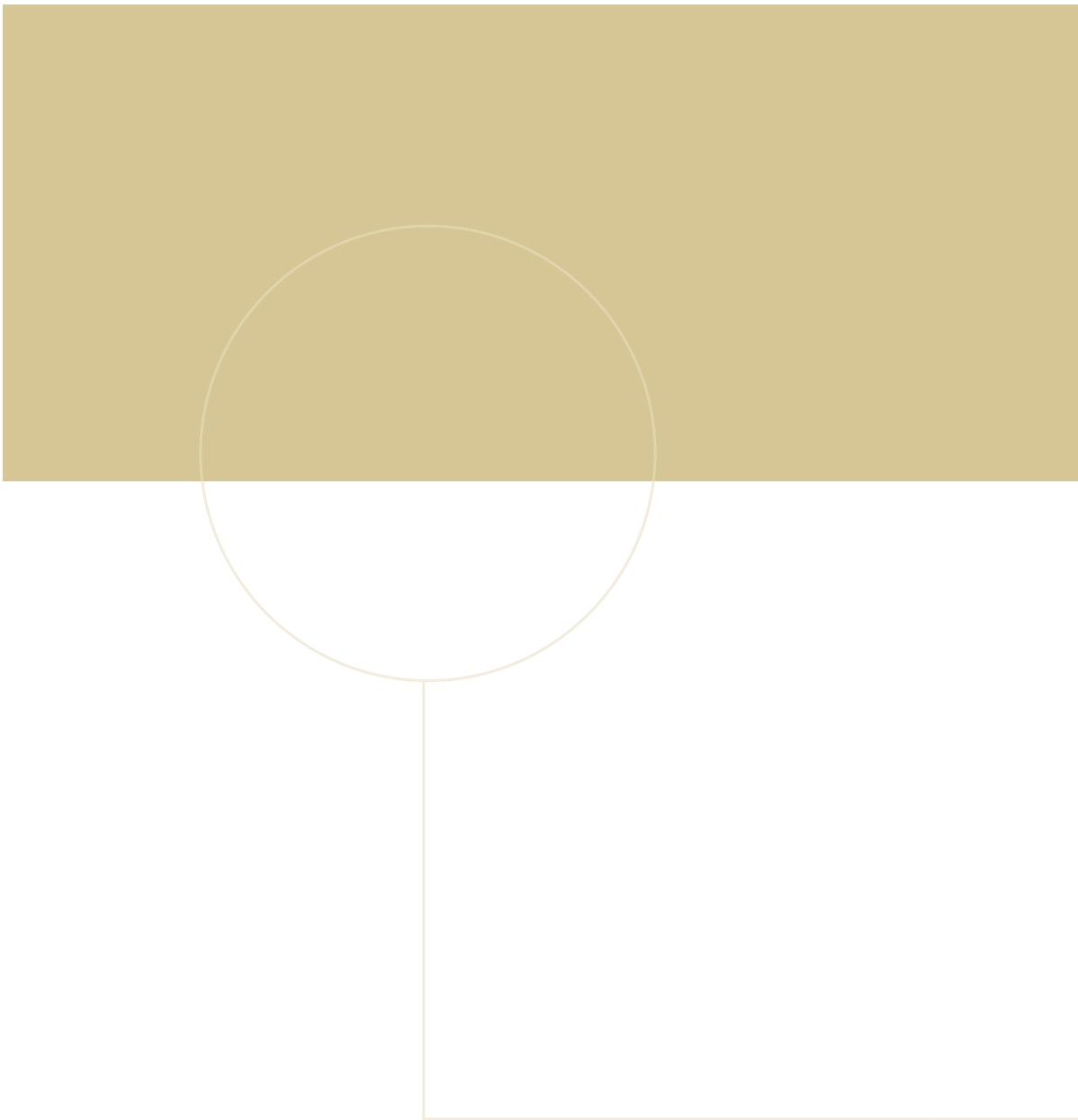
Elements from A7442.

A7443, Grave XIV

Box containing A7443.

A7446, Grave XIb

Box containing A7446.



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