The Bioarchaeology of Impairment and Disability in Medieval Helsingborg:

- A Population Analysis of the Skeletal Material from the Convent of S:t Nicolai

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Abstract:

Disability is an aspect that forms a significant part of the human condition. According to the World Health Organization (WHO) an estimated 1 billion people worldwide live with a disability. That accounts for roughly 15 % of the entire human population, and therefore it has been sometimes referred to as the world's largest minority. The presence of people with disability is a phenomenon that is not widely discussed in the historical record and therefore the prevalence and attitudes towards disability is not well understood. Bioarchaeology offers an unique opportunity to answer some of the questions regarding disability in the past.

Utilizing a newly developed methodology, called Bioarchaeology of Disability (BoD), this study aims to inquire about the status of disability in the medieval cemetery of S:t Nicolai, in Helsingborg, Sweden. The focus in this study lies upon individuals with traumatically acquired impairments. The results show that there was a clear effort to bury people with severe impairments in marginal areas of the cemetery. All the severely impaired individuals were buried far away from the church, and/or located isolated from the other individuals. The individuals with less severe impairments were, on the other hand, granted normative burials, and were buried close to the church and in close association with the remaining non-impaired population. The results follow what contemporary religious and legal sources state regarding impairment and disability.

Keywords; *Bioarchaeology of Disability, Disability Studies, Osteology, Bioarchaeology, Trauma, Medieval Helsingborg, S:t Nicolai, Middle Ages*

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1. Introduction:

One of the most powerful aspects of bioarchaeology is the ability to study people that have been largely ignored in the historical record. One such forgotten group are people with disability. The United Nations estimates that around 1,000,000,000 (billion) people in the world today are disabled, which accounts for roughly 15 % of the entire global population (UN, accessed 2023-03-07). This large number has made it so that disabled people are sometimes referred to as the world's largest minority.

A significant portion of the world's disabilities are caused by violence and injuries. However, the data regarding this is very limited, and is not well documented in many countries. Some estimates nonetheless exist in certain countries, which indicate that up to 25 % of all disabilities are caused by violence or injury (Sminkey, 2020). Data from Mexico shows that roughly 17.7 % of all disabilities are alone caused by unintentional violence (Sminkey, 2020). In Hungary the number is 12.7 % and in Sierra Leone it is 14.3% (Sminkey, 2020). These numbers, along with that of intentional violence, naturally go up during times of war and conflict, which was a rather common occurrence in the Middle Ages. Many contemporary sources state numerous examples of people, through either; accidental purposeful and even lawful means, becoming physically impaired (see for example; Metzler, 2006, 2013, Skinner, 2014, 2017). Understanding the general treatment impaired individuals received gives us a lot of insights regarding their general worldview and society at large.

1.1 Purpose and Aims:

The purpose of this thesis is to study impairment and disability in the early- and high medieval material from the cemetery of S:t Nicolai, Helsingborg. By utilizing a newly developed method, called Bioarchaeology of Disability (BoD). This new method focuses on a population-scale approach, with the aim to gain a more accurate view of disability in the past.

1.2 Research Questions:

1. What is the prevalence of trauma induced physical impairment in the early- and high medieval material from S:t Nicolai, Helsingborg?

2. What is the normative funerary treatment in S:t Nicolai, and is there any recognizable difference between impaired and non-impaired individuals, how does this relate to the religious and legal views at the time, and can such a potential difference be attributed to disability?

3. Critically evaluating the usefulness of the BoD, strengths and weaknesses and areas of improvement.

1.3 Definitions - Impairment vs Disability:

An important matter that needs to be properly defined before engaging with the subject is the difference between impairment and disability. Although the words might seem to be synonymous with one another, and could therefore be used interchangeably, they do in fact refer to two different concepts.

Impairment, in the context of disability studies, is the actual medical and physiological diagnosis that causes limited movement, function and/or a visible deformity (Metzler, 2006 p. 20, Wheatley, 2010 p. 5). Impairment is either congenital, i.e present at birth, or acquired later in life, i.e through either sickness or injury.

Disability, in the context of disability studies, is defined as the social attitude society has towards people with impairments (Metzler, 2006 p. 20, Wheatley, 2010 p. 5). The emphasis here is thus not on the medical diagnosis of the impaired individual, but rather on the societal reaction towards it.

The relationship between these two terms is as follows:

- An impaired person does not necessarily have to be a disabled person, since disability is a discriminatory social/cultural reaction towards people with impairment. Impairment can be found using standard paleopathological techniques, unless they are mental, e.g autism, or sensory related, e.g a loss of sense regarding taste or hearing. Such impairments can only be speculated if there exists enough evidence that leads credence to such a conclusion, for example severe cranial trauma.

- A disabled person is, by definition, always impaired, since disability is a discriminatory social/cultural reaction towards people with an impairment. Disability can therefore not be found using standard paleopathological techniques. It can only be found by studying culture, which involves a combination of data from archaeological-, anthropological-, osteological- and written historical sources.

The criteria in this study for considering an individual impaired is based upon two things:

1. Injuries which have resulted in a restriction, or complete elimination, of a particular bodily function, for example: an injury upon the femur which would have resulted in an inability to properly walk.

2. Injuries which resulted in an apparent visual and aesthetic differentially, for example: major scars and/or disfigurement.

An individual needs to meet one or both of these criterias in order to be considered physically impaired. Small bony formations, and other insignificant ossifications that have no bearing upon an individual's life will not be considered as impairing, as they would not meet any of the two criterias mentioned above.

2. Background:

2.1 Research History:

2.1.1 History of Disability Studies in Bioarchaeology:

The establishment of disability studies as an academic field began in the 1990s in the aftermath of the political disability movement of the 1970s and 1980s in Canada, the United Kingdom and the United States (Metzler, 2006 p. 20). The history of disability studies in bioarchaeology is, however, a fairly recent phenomena and thus there has been a limited amount of research conducted on the subject. Most studies that have been done have focused on single individuals in a case study approach and were more concerned with describing the physical ailments rather than focusing on the wider social implications (Southwell-Wright, 2013 p. 67).

One of the earliest examples of this is the case regarding the Neanderthal Shanidar 1, an individual with many severe injuries (Solecki, 1971). All of the injuries show extensive signs of healing, which proves that they did not result in immediate death. The result of all the injuries would most likely have been paralysis of the right arm and probable blindness of the left eye (Trinkaus & Zimmerman 1982 p. 69). Despite these severe impairments Shanidar 1 was still cared for, since without extensive care he would have most likely not survived with such severe injuries (Solecki, 1971). Solecki, the lead of the team who discovered Shanidar 1, stated in 1971:

- "*the very fact that their lame and wounded (Shanidar Neanderthals I and II) had been cared for in the cave is excellent testimony for communal living and cooperation"* (Solecki, 1971).

Shanidar 1 thus became an example of compassion in human prehistory, a notion that was previously seen as unlikely. The study of Shanidar 1, along with two other studies from the late 1980:s; one by David Frayer (1987) on Romino 1, an individual with dwarfism, and another by Dickel and Dorian (1989) on Windover boy, a young individual with severe spina bifida, were heavily criticized by american anthropologist Katherine Ann Dettwyler (1991). In her article, which was published in the *American Journal of Biological Anthropology* in 1991*,* titled "*Can paleopathology provide evidence for "compassion"?*", in which she criticizes the three studies for relying on too many assumptions and drawing conclusions that are anachronistic to the individuals respective time periods (Dettwyler, 1991 p. 379-383).

Dettwyler highlighted some important aspects to consider when studying disability in the past, and served as a wake-up call for researchers interested in the subject. However, instead of inspiring more research, it had the unfortunate consequence of intimidating people from further studying disability, and thus the field received little attention during the 1990:s and early 2000:s (Byrnes & Muller, 2017 p. 4, Southwell-Wright, 2013 p. 76). One of few studies that was conducted during this time was by Knüsel in 1999. Knüsel used mortuary and burial data in order to establish if individuals with impairment were subject to discrimination in their burial (Knüsel, 1999). The utilization of the burial data allowed for a conclusion regarding disability based on cultural evidence, rather than just on modern day assumptions. However, the study failed to distinguish between impairment and disability and generally used the terms interchangeably (Byrnes & Muller, 2017 p. 4). The article also focuses on three single individual case-studies, and is thus limited in what wider conclusions can draw.

Although single individual case-studies are important, since they can provide answers to how a specific person was treated, it nonetheless lacks the ability to answer larger questions concerning the wider community and society at large (Bohling, Croucher & Buckberry, 2022 p. 92). Recent developments within bioarchaeology have therefore been towards developing and conducting studies on the population-scale, rather than on the individual-scale. The first example of this trend is from 2017, in a study by Emma Brownlee titled "*"In the resurrection, no weakness will remain": Perceptions of disability in Christian Anglo-Saxon England*". The study utilizes 17 different English cemeteries from the late Anglo-Saxon period (800-1066 CE) and combines the osteological, archaeological and historical evidence in order to establish the societal view of disability (Brownlee, 2017 p. 53). Other recent studies also utilize this type of an approach towards disability (see: Zakrzewski et al., 2017, Bohling, 2020, Bohlin et al. submitted for publishing).

In 2022, Solange Bohling, Karina Croucher and Jo Buckberry, published an article in "*The International Journal of Paleopathology*", tilted *"The Bioarchaeology of Disability: A population-scale approach to investigating disability, physical impairment, and care in archaeological communities"*. The article aims to create a clear and replicable workflow for investigating disability on a populational scale called "Bioarchaeology of Disability", acronymed as BoD (Bohling, Croucher & Buckberry, 2022 p. 92). The hope is that the creation of a new and clear methodological approach will stimulate the development of more research into the subject in the future.

2.1.2 Research History: S:t Nicolai:

The skeletal material from S:t Nicolai has been subject to three osteological studies. Despite the fact that the material was excavated already in the 1950s was it only until 2020 when the first osteological study was published. The study was made by Caroline Ahlström Arcini, titled "*Möt de medeltida helsingborgarna*". This study not only focused upon the material from S:t Nicolai, but rather from all the medieval cemeteries in Helsingborg. The study examines the general living conditions among the population in medieval Helsingborg (Arcini, 2020 p. 78). Regarding the individuals from S:t Nicolai specifically, it was especially noted for the high prevalence of battle induced injuries (Arcini, 2020 p. 102-103).

The material was, in 2021, analyzed by Sandra Fritz in her Master's thesis titled "*Establishing the paleodemography of S:t Nicolai High Medieval cemetery - An evaluation*

study of the Transition Analysis 3 method". Utilizing the newly developed Transition Analysis 3 (TA3) methodology for age estimation it shows that people lived longer than previously thought. Over half of the individuals (56 %) were estimated to have died at over 50-years of age (Fritz, 2021 p. 52).

In 2022 was the material from S:t Nicolai once again part of an osteological study. Three bachelor students from Lund University looked at the entire skeletal material in order to study the prevalence of head trauma. The combined studies shows that the early- and late medieval material have a similar percentage of head trauma, whilst the high medieval material stands out with it having much less (Ljungdahl, 2023, Haglund, 2023, Carlberg, 2023).

2.2 Medieval Helsingborg:

Helsingborg, along with the entire region of Scania, were during most of the Scandinavian Middle Ages, roughly encompassing the time period between 1050-1520 CE, a part of the Kingdom of Denmark. The one exception to this is between 1332-1360 CE, during which Scania was briefly under Swedish jurisdiction, known as "*Skåneaffären 1332*" (Andersson 1974, p. 131). After the Danish reconquest, in 1360 CE, would Scania remain as a part of Denmark until the treaty of Roskilde in 1658, when it was transferred over to Swedish rule once again, where it remains to this day (Andersson, 1974, p. 131, Kruse, 2020).

The earliest signs of human occupation in the area are dated to the Bronze Age, in the form of dwelling-remains and monumental graves (Thomasson, 2020 p. 24). The earliest written mention of Helsingborg is dated to the late 11th century, in a chronicle written by Adam of Bremen, where it is mentioned under the name "*Halsingburg*" (Kruse, 2020). In 1085 CE was Helsingborg mentioned for the first time as a town, due to it being mentioned in tax records, which at the time was a criteria for being classified as a town (Hök & Kindström, 2005 p. 14).

Helsingborg is located at the geographically narrowest part of Öresund, where the distance between Zealand and Scania is only 4 kilometers. This geographically important area, including the raised topography called the "Helsingborgsryggen", has made Helsingborg into a valuable asset for any ruling power in the area (Weidhagen-Hallerdt, 2009 p. 187). This fact can be observed by looking at the many fortified structures inside and surrounding the city that have been constructed throughout the centuries (Hök & Kindström, 2005 p. 14). The

earliest evidence of fortification in the area is dated to the Viking age (Weidhagen-Hallerdt, 2009 p. 197). The fortification has been identified as a possible Ringfort, which was a common type of fortification in the late Viking Age, with similar structures being found on both sides of the Öresund strait (Weidhagen-Hallerdt, 2009 p. 197).

An important area in Helsingborg, that during the Middle Ages would be the heart of the city's defences, is Landborgen. Landborgen is the steepest part of Helsingborgsryggen and was created as a result of extensive erosion caused by the rushing of water from the melting ice sheet, roughly 17,000-13,000 years ago (Thomasson, 2020 p. 22). This created a strategically advantageous location that would form the basis for the construction of fortifications in the Middle Ages. For example, in 1310 CE the Danish king, named Erik Menved (1274-1319 CE), gave the order for the construction of a new fort at Landborgen, which finished construction circa 1320 CE. Kärnan, the main tower of the fort, is one of the few remaining medieval buildings still standing in Helsingborg, and can still be visited to this day. The tower was renovated in 1883-1884, which has given its current appearance, see figure 1 below (Wihlborg, 1984 p. 62).

Figure 1: Photograph of Kärnan taken in 2011 by Jens Hunt (Hunt, 2011 CC, https://commons.wikimedia.org/wiki/File:K%C3%A4rnan_Helsingborg.jpg)

2.2.1 Mendicant Orders:

S:t Nicolai was not an ordinary parish-church, but rather was a convent owned and operated by the Dominican Order. The Dominican Order, also known as the Beggar's Order, Friars Preacher and Black Friars, is a Christian convent founded in 1215 CE, by a Castilian priest named Domingo de Guzmán (1170-1221 CE), later being canonized as Saint Dominic (Iturgaiz, 2003, Hök & Kindström, 2005 p. 15). The Dominican Order is a sub-group within the wider religious movement called the "Mendicant Orders" (Burton, 1994 p. 109). The Mendicant Orders involve four main groups, with the other three being; the Franciscans, the Augustinians and the Carmelites (Burton, 1994 p. 109). The Dominican order differentiated itself from the other Mendicant Orders by focusing on preaching, which is seen by their nickname "Friars Preacher".

The friars within the Mendicant Orders, unlike those of other monastic institutions, were not allowed to live within the cloister, or support their own upkeep by the ownership of property. They would instead travel from place to place and support themselves by the means of begging (Burton, 1994 p. 109). This self-enforced life of poverty made them particularly popular with the poorest members of society. Saint Francis of Assis (1181-1226 CE), the founder of the Franciscans, explains the rationale for this endeavor:

- *"Let all the brothers strive to follow the humility and the poverty of our Lord Jesus Christ and let them remember that we should have nothing else in the whole world except, as the Apostle says, having food and clothing, we are content with these."*
  -Saint Francis of Assisi (Nairn, 2017 p. 9-10).

This lifestyle, of wandering from place to place, posed an incredible health risk, and could often lead to severe- and even permanent injuries. Friars could spend many months, or even years, on the road, which could often take place in inhospitable conditions and rugged terrain, which would lead to an increased risk of things like; accidental tripping, frostbite, loneliness and depression (Metzler, 2013 p. 53, Montford, 2002 p. 96). Constant hunger and being on the brink of starvation was also common during these journeys, which would have weakened their immune-system and made them more susceptible to contract disease, like for example dysentery (Metzler, 2013 p. 53). The danger of this lifestyle is best exemplified by Stephen of Auvergne, a Dominican friar, who in 1250 had to resign from his duty as provincial prior of Provenance due to suffering a serious injury while traveling on the road (Metzler, 2013 p. 53).

This lifestyle would have made many friars within the Dominican Order familiar with the experience of living with disease and injury, which could be an important aspect that influenced their ability to connect with people from the poorer levels of society.

However, any such understanding seems to not have been extended upon entry into the order itself. Sickness and impairment was a major barrier of entry for becoming a friar within the Mendicant orders (Montford, 2002 p. 95). A Franciscan statute from 1337 states:

- *"Novices must publicly acknowledge and witness that they are not concealing any latent illness they have, otherwise the Order shall not have any obligation to them."* (Bihl, 1914 p. 485).

This issue was already raised by Humbert of Romans, the fifth Master-general of the Dominican Order between 1257-1263 CE, who stated:

- *"It is... useful to the preacher to be strong in body so that he can stay up late at night studying, speak loudly when he is preaching, endure the labours of travelling and the poverty of not having the things he needs and many other hardships."*
  - Humbert of Romans (Montford, 2002 p. 96)

The Mendicant lifestyle necessitated that the friars had the necessary strength and stamina to perform their physically demanding work. For example a letter from a Francisan convent member, from the 13th century, stated that a friar needed to be able to walk 6 leagues a day, which translates to 28.9 kilometers per day (Montford, 2002 p. 96). This is a criteria that many impaired people would struggle to do, which explains the rationale behind the ban.

However, the ban was not only for people with function- and/or movement restricting impairments, but also towards people with disfigurements. Humbert of Romans stated the following concerning the baring of disfigured individuals within the order:

- *"People who are disfigured in this way are debarred from the Lord's service in Leviticus [21.17] and similarly the Church has banned them from public office for fear of popular scandal and ridicule."* - Humbert of Romans (Montford, 2002 p. 99).

This account also gives insight towards the way many disfigured people were treated, with ridicule and shame seemingly being a rather common occurrence.

The Mendicant orders would often come into conflict with the local secular clergy that operated in a given area. For example, well established Mendicant convents would not only compete with the function of the local parish priest, in terms of preaching, repentance, confessions and granting absolution, but also with revenue, in terms of burial dues and offerings (Burton, 1994 p. 126). This resulted in an early crisis that broke out in London, during 1230-1231 CE, which resulted in the Bishop of London claiming legal authority over all Mendicant convents. A papal bull was issued which granted the Mendicants the authority to govern their own activities and thus the crisis was temporarily averted (Burton, 1994 p. 126-127). However, tensions between Mendicants and the secular clergy would continue, and throughout the 13th- and 14th century multiple papa bulls were issued that aimed to determine their relationship (Burton, 1994 p. 127). A compromise would be reached in 1300 with the papal bull of *Super Cathedram*, however tensions would still be present on a local level in many areas (Burton, 1994 p. 127).

Another matter of controversy was the notion of gift-giving towards people that were not in dire need. A clear difference was established between "*Wilful Poverty*" and "*Involuntary Poverty*", which was established as early as the 4th century by Saint Jerome (Metzler, 2013 p. 167). It was argued that the involuntary poor, i.e those poor due to unfortunate social circumstances or out of sickness, were consumed by a desire to acquire wealth, known as the sin of cupidity (Metzler, 2013 p. 167). Voluntary poverty was, on the other hand, seen as being a part of religious vocation, and was instead praised (Metzler, 2013 p. 166). This way of thinking was often cited by both Dominican and Franciscan friars as a justification for their behavior (Metzler, 2013 p. 167).

This notion was not universally accepted by everyone within the church, who often argued that people that can work should not receive alms. James le Palmer (1327-1375 CE) wrote concerning the alms-giving to Mendicant Friars:

- *Alms should not be given to mendicant friars who are able-bodied and capable of physical labour nor to any other abled-bodied persons who can do physical labour*" -- James le Palmer (Metzler, 2013 p. 168).

Both these examples highlight the strained relationship the Mendicant orders had with many contemporary intellectuals and various religious institutions.

The Dominican Order established convents all over Europe and Scandinavia, and by the end of the Middle Ages there were four such convents in Scania alone, located in Lund, Malmö, Helsingborg and Åhus (Hök & Kindström, 2005 p. 16). In fact, by the time of the protestant reformation, roughly 40% of all monastic establishments in medieval Denmark belonged to various Mendicant Orders; 29 Franciscan, 19 Dominican and 8 Carmelite (Larsen, 2018 p. 43). The Mendicant Orders, and by extension the Dominican Order, thus played a central role in the religious-, cultural- and political landscape in the Danish medieval townscape (Larsen, 2018 p. 43). The Dominican convent in Helsingborg, however, was one of the smaller and less influential Mendicant convents in Scandinavia, and thus it is sparsely mentioned in contemporary sources (Hök & Kindström, 2005 p. 17).

2.2.2 Dominican Order in Helsingborg:

The Dominican Order, in Helsingborg, had the convent of S:t Nicolai as its base of operations during the Middle Ages. The construction of the convent would start in 1269 CE and finish in 1275 CE, however, evidence suggests that friars following the Dominican Order were already present in the city as early as 1263 CE (Hök & Kindström, 2005 p. 16). The convent was located at Landborgen, south of the castle, and in the vicinity of a heavily trafficked road, which was an advantageous spot in the purpose of preaching and spreading influence (Hök, & Kindström, 2005 p. 16). The convent was made up of multiple buildings with the most important one being the church itself. The church was named, and consecrated, after Saint Nicholas, the patron saint of trade, seafarers and children (Hök & Kinström, 2005 p. 16, Garner, 2016). The other parts of the convent, that are relevant in this study, are those that contain burials, which involves; the choir, the longhouse and the northern cemetery, see figure 2 on page 16.

As briefly mentioned before, one way, other than begging, that Mendicant convents could gain revenue was through the collection of burial dues (Burton, 1994 p. 126). This made it so that only wealthy enough individuals could be buried in their grounds, which stands in stark contrast to their own poverty stricken way of life. This economic aspect is also visible by looking at the paleodemography of S:t Nicolai, with the material being dominated by males and few children. The burial grounds themselves were also economically stratified with the choir being the most prestigious part of the complex, ahead of both the longhouse and the northern cemetery, in that order. This is evident when looking at the funerary treatment of these different areas (for more information see chapter 7, page 38).

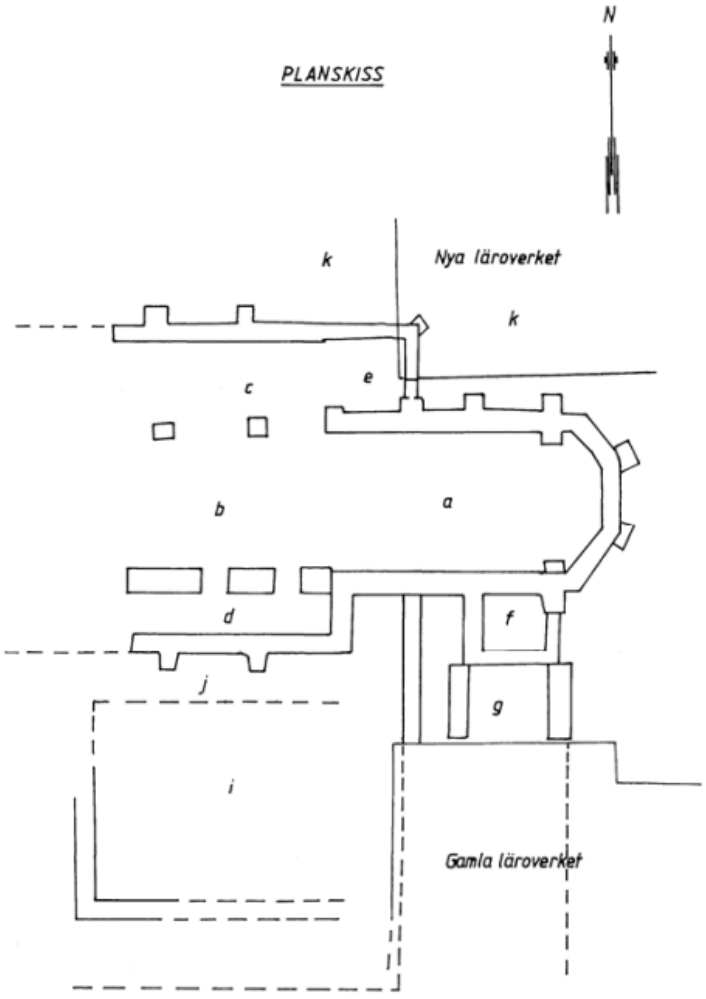

Figure 2: Plan of the known outlines of the S:t Nicolai convent. The relevant areas in this study are marked as; ***a****= Choir,* ***b*** *&* ***e****= Longhouse &* ***k****= Northern cemetery (Hök & Kindström, 2005 p. 18).*

The popularity of Saint Nicholas, and the influence of the Mendicant Orders, would after the reformation in the 16th century greatly diminish in the protestant part of Europe. In 1536 CE protestantism became the official state-religion of Denmark, which, in 1537 CE, led to the seizure of all assets owned by the Mendicant Orders by the crown (Hök & Kindström, 2005 p. 17, Garner, 2016). During the subsequent decades the convent stood abandoned, until 1556 CE, when after years of disrepair it was finally demolished.

The Dominican Order is still present as a Christian organization today, but its influence has been greatly diminished when compared to during the Middle Ages. However, the influence of Saint Nicholas is arguably even stronger today, given he is the original inspiration of Santa Claus and the tradition of gift giving during Christmas (Garner, 2016).

3. Theoretical framework:

3.1 Theory of Disability:

Since the establishment of disability studies as an independent field in the 1980:s have many different theories have developed as to how one should approach and view disability and impairment.

3.1.1 The Religious Model

The oldest model of disability is known as the religious model, and is present as a theological concept in many religions over the world, including Christianity (Retief & Letšosa, 2018 p. 2). The religious model views impairment as divine punishment for committing sin, which includes sins committed by yourself, by family members and even distant ancestors (Retief & Letšosa, 2018 p. 2, Otieno, 2009). This creates a negative view towards impaired individuals which even has the potential to lead to the ostracisation of entire families within their local communities (Retife & Letšosa, 2018 p. 2). However, impairment can also be seen as a test of faith by God himself, or as a form of metaphysical blessing (Retief & Letšosa, 2018 p. 2). Thus impairment, at least in certain elite religious circles see chapter 6.1.2 on page 30, has the potential to be seen as something positive.

Today the religious model is not as prevalent as it was in pre-modern society and is, by its very nature, an unscientific understanding of impairment and disability. Thus, the main discourse within modern disability studies revolves mainly around three other models; the medical-, the social- and the interactional model.

3.1.2 The Medical Model

The medical model was the first modern theoretical view and was the prevailing model in the study of paleopathology in the past (Southwell-Wright, 2013 p. 76). This model defines a person as disabled based on their medical, physical and visual deviation from the medically defined biological norm (Riddle, 2013 p. 24). According to medical theorists, the best way to treat disability is by removing the impairment, by either medical or technological innovation. Preventative actions are also proposed, like for instance biological screening and/or gene manipulation (Riddle, 2013 p. 24). This model highlights impairment as a problem that can only be solved with medical intervention.

3.1.3 The Social Model

With the establishment of disability studies as an academic field a new way of viewing disability was introduced, called the "*social model*". The social model focuses not on the physical aspect of impairment, but rather on the societal and social attitudes towards impairment. A social theorist would argue that disabling barriers are a result of societal organization rather than an individual's limited functional capacity (Riddle, 2013 p. 25). Disability is thus external to the individual. One of the founders of the social model, Michael Oliver, summarizes the view of the model as follows:

- *"It is not individual limitations, of whatever kind, which are the cause of the problem, but society's failure to provide appropriate services and adequately ensure the needs of disabled people are fully taken into account in its social organization"*
  -Michael Oliver (Oliver, 1996 p. 32).

This theory argues that it is disability that makes impairment a problem and not the other way around. In fact, the theory does not even consider the medical aspect with regards to impairment and only focuses on the social aspect.

The social model became wildly popular and in 1999 was universally accepted as the primary model for studying disability (Bickenbach et al., 1999 p. 1). However, since then the model has received a lot of criticism within the scientific community, primarily for placing too little emphasis upon the medical aspect of disability. Therefore there is today a push for a new theory regarding impairment and disability.

3.1.4 The Interactional Model / Critical Realism:

The social model has received a lot of critique, out of which another theoretical model has been proposed. This model, called "the interactional model", or the "critical realist model", tries to combine the best elements from both the medical- and social model. The main critique that this theory has of the previous models is their rejection of the dichotic relationship between disability and impairment (Shakespeare, 2014 p. 72). The previous two models either place all the emphasis on the medical/physiological aspect, i.e the impairment aspect, or only on the societal cultural attitude, i.e the disability aspect. Both of the theories thus fundamentally ignore each other and essentially talk past each other. The interactional model argues that there is a causal relationship between impairment and disability. Without the relationship between impairment and disability the social model essentially becomes a

theory to regard all forms of social oppression (Riddle, 2013 p. 25). The term and theory becomes too broad and thus loses its original meaning.

One of the most prominent advocates for the critical realist model is sociologist Tom Shakespeare. His main critique of the social model is that it minimizes the limitations and difficulties that certain impairments have on a person. Certain impairments, no matter how many societal accommodations are made, or how many social barriers are removed, can not be totally made null and void (Shakespeare, 2014 p. 74-80). Certain impairments cause fatigue and/or pain that acts as a constant reminder of one's condition. Societal adaptation is not enough to change this reality, even though it often alleviates some of the worst aspects.

The social model has, however, not been entirely replaced by this new theory. The social model still functions as a great theoretical framework in political organization, as the theory empowers disabled people to politically organize and demand change (Riddle, 2013 p. 26-27). Many political parties that advocate for disability-rights were formed based on the social model, which has had a tremendous impact for hundreds of millions of disabled people all over the world (Riddle, 2013 p. 26-27). The main field of use for the interactional model is instead in a more academic understanding regarding the various dynamics that are at play, which is why many bioethicists and philosophers have embraced it (Riddle, 2013, p. 22).

The interactional / critical realist model is the model that will be utilized in this study, since it allows for a more complete and complex understanding of disability. It allows for both detecting impairment with paleopathological methods, in a medical way, but also allows room to investigate and discuss the social considerations that ultimately make an impaired individual become disabled.

3.2 The Osteological Paradox:

An important theory that permeates through every osteological analysis is the "*Osteological Paradox*" (Wood et al., 1992). The osteological paradox is the name of a set of phenomena that has a colossal impact on osteological studies. One of the main concepts that this discusses is summarized in the following sentence: "*Better health makes for worse skeletons.*" (Wood et al. 1992, s. 356). This statement is a reference to the fact that individuals that die too fast, for instance by tuberculosis, would not have had the time to develop the specific skeletal lesions that are associated with the disease. This means that the skeletons

which look the most “normal” and healthy might in life have been the most unhealthy. Healthy individuals could survive with tuberculosis for a longer period of time and thus their skeleton would start to develop lesions and ultimately look worse. This phenomena is a great challenge for osteologists, since it has an enormous impact upon the eventual conclusion one might draw from a material. It also disguises the actual prevalence of diseases in the past and thus certain diseases are probably much more common than traditional osteological methods indicate. This can somewhat be circumnavigated using a-DNA.

The impact this has on disability studies is that it creates a selection bias towards individuals with sufficient enough health to survive severe trauma. Less healthy individuals would struggle to survive with certain injuries and would therefore not live a life with physical impairment and disability. One could therefore argue that the individuals with physical impairment are some of the most healthy people in society, since without good health they would struggle to survive with their impairment in the first place.

4. Material:

The material used in this study comes from the Christian medieval cemetery of S:t Nicolai in Helsingborg, Sweden. The cemetery was excavated between 1952-1954 and resulted in the exhumation of 375 individuals (Hök & Kindström 2005). These individuals are categorized into four distinct groups, from A-D, based on the individual's arm-positioning by the standard set by Lars Redin, and are thus tied to date-of-burial, see figure 3 on page 21 (Redin, 1976). Category A is dated between 900-1250, B between 1250-1350, C between 1350-1400 and D between 1400-1500 (Hök & Kindström, 2005 p. 37). This study utilizes only the individuals from category A & B, which numbers in at a total of 76 individuals. This selection was made because there exists valuable data from previous studies regarding age and sex that will improve the accuracy of the analysis, see chapter 5.3 and 5.4 on page 25.

The material, as previously mentioned, is spread out between three different areas, based on socioeconomic background, the choir, the longhouse and the northern cemetery. However, the exact location of some individuals is not entirely clear. This is likely because the report regarding the excavation was first started in 1999, and published in 2005, whilst the excavation itself took place between 1952-1954 (Hök & Kindström 2005 p. 3).

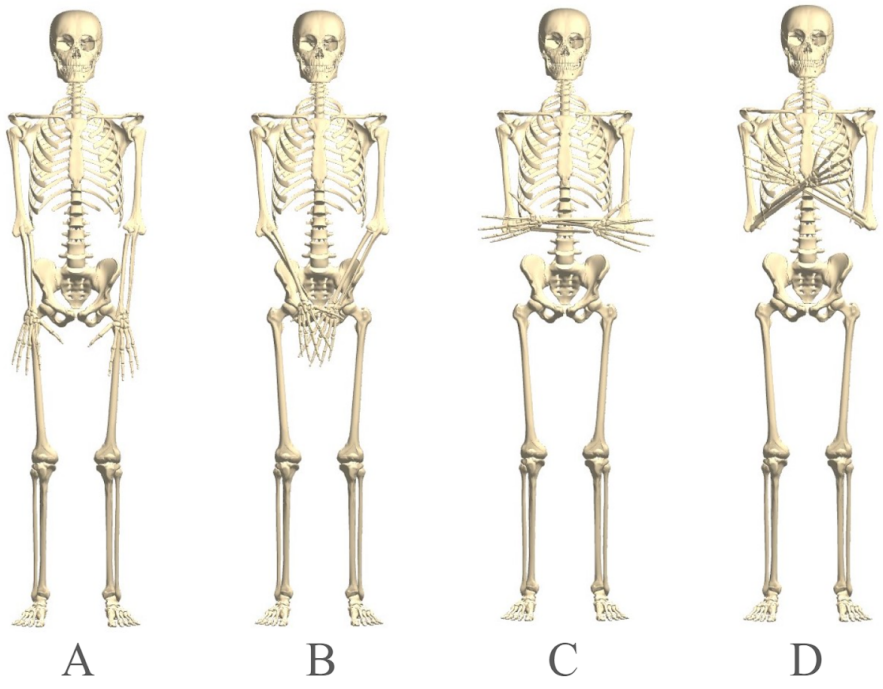

Figure 3: The categorization of arm-positioning according to Redin (Redin,1976 p. 32-33). Illustration made using KineBody Pro (2022) https://www.kinebody.com/default.php

Thus there is over a 50-year gap between the end of the excavation and the publishing of the report. Therefore, some information may not have been properly documented. This has resulted in 7 individuals being classified as “northern cemetery” but with an added question mark, and two other individuals classified as unknown. Another impact is that certain individuals are not illustrated in the map covering the cemetery, see chapter 11 Appendix, page 77.

4.1 Taphonomic Condition in S:t Nicolai

An important concept that has a great impact upon archaeological materials is taphonomy. Taphonomy is the science of decay, regarding how and why certain materials decay in the manner they do. Taphonomy has a great impact in all archaeological research, since all archaeological material is material that has survived a constant rate of decay throughout centuries, and even millennia in certain contexts. Thus, a comprehensive understanding of taphonomy is of utmost importance when considering the wider conclusion one can make regarding a particular material.

Taphonomy has a great impact upon osteological studies, since one can only make paleopathological diagnosis on bones that are available for study. The better the material is

preserved, the more accurate a diagnosis and analysis becomes. The application of BoD should therefore be done upon materials that are preserved in what is referred to as “relatively good condition” (Bohlin, Croucher & Buckberry, 2022 p. 77).

The S:t Nicolai skeletal material is preserved in a relatively good state. During the analysis it was noted if the remains were too fragmented to properly assess impairment. This was deemed to be the case for 19 individuals, 11 of which were in the northern cemetery, 4 in the longhouse, 3 in the choir and 1 whose location is unclear. Thus, 57 individuals were deemed to be in an adequate condition for assessing physical impairment. One could also look at how many individuals had enough material to conduct estimation of stature, see chapter 5.5 on page 26, which could be performed on all but 10 adult individuals. Sex estimation, see chapter 5.4 on page 25, gives another indication, and it could be performed on all but one (1) adult individual. All of these examples combined highlights the relatively good condition of the material.

Taphonomy also impacts the way burial patterns are later recorded and subsequently interpreted. Certain aspects of burial treatment, like wooden coffins and other materials made of organic material generally struggle to survive. This adds another dimension and importance towards the preference of choosing material(s) with good taphonomic condition.

5. Methodology:

5.1 Bioarchaeology of Disability (BoD):

The methodology utilized in the study will closely follow the example set by an article published in the International Journal of Paleopathology titled “*The Bioarchaeology of Disability: A population-scale approach to investigating disability, physical impairment, and care in archaeological communities*” by Solange Bohlin, Karina Croucher and Joe Buckberry in 2022. This article outlines a workflow regarding how to study disability; physical impairment and care on a population-scale approach. The authors are clear that this methodology can be replicated in any form of archaeological context regardless of time and space.

Before applying the BoD a material must first be chosen. The BoD recommends using cemeteries that contain at least 50 individuals (this number can be changed depending on the specific context), material preserved in a good taphonomic condition, has evidence of physical impairment and are physically accessible for analysis. Once a single or multiple material(s) have been chosen the approach becomes divided into three distinct phases of action; contextualization, data collection and analysis, see figure 4 on page 24.

The first step is called the "*Contextualization Phase*", see chapter 6 in this present work (Bohlin, Croucher & Buckberry, 2022 p. 77). This step involves a literature review of disability and funeral treatment regarding the time period and geographical area that is studied. This involves both religious and legal views. Another area of study is burial practices of said area and time period. In this specific context the time period in question is medieval Europe, and more specifically northern Europe.

The second step is data collection, see chapter 7 in this present work, known as "*Results*" (Bohlin, Croucher & Buckberry, 2022 p. 80). During this step all individuals with physical impairment are identified and are re-analysed in order to confirm if previously made assessments are in agreement with one's own estimations. The cause and impact of a particular impairment should be considered here as to determine what influence it might have had on the individual's life (Bohlin, Croucher & Buckberry, 2022 p. 80). Any previous age- and sex estimation should also be verified by the use of a Cohen's Weighted Kappa test.

A Kappa test is a statistical equation that is often done on studies that measures the agreement between two, or more, observers (Viera & Garrett, 2005 p. 360). Diagnostic interpretations that are made on observable differences are, to a certain degree, made subjectively. An agreement between two separate observers can therefore be down to simple chance. The Kappa test bases its calculation by looking at how much agreement is present between two observers and how much agreement can be expected to be down to chance (Viera & Garrett, 2005 p. 360). A weighted Kappa test follows this same logic, but instead it takes into account the difference between the criterias. A weighted Kappa test assigns less weight the closer to agreement a difference is, and subsequently adds more weight the further away a differing categorization is (Viera & Garrett, 2005 p. 362). In order to confidently use the previously made assessments the BoD recommends that the score needs to be 0.6 or above (Bohlin, Croucher & Buckberry, 2022 p. 79).

Another part of the second step involves the collection of funerary data for all individuals from the burial assemblage (Bohlin, Croucher & Buckberry, 2022 p. 80). This includes for example, burial goods and the prevalence regarding remains of coffins.

The third and final step is the analysis/interpretation, see chapter 8 in this present work, titled "*Discussion*" (Bohlin, Croucher & Buckberry, 2022 p. 80). Here the funerary treatment of individuals with physical impairment is compared and contrasted with the non-impaired. The analysis involves both looking at each individual with physical impairment separately, but also looking at them as a wider group (Bohlin, Croucher & Buckberry, 2022 p. 80). Are there any patterns that differentiate the impaired from the rest of the population, like, for example, is the prevalence of grave goods the same in impaired versus non-impaired burials, or are all the impaired individuals buried in marginal areas of the cemetery? Here it is important to take into account all the complexities that go into interpreting funerary treatment, for example the agency of the living versus the dead, the possibility of manipulated identities and fragmentary nature of archaeological data (Bohlin, Croucher & Buckberry, 2022 p. 80).

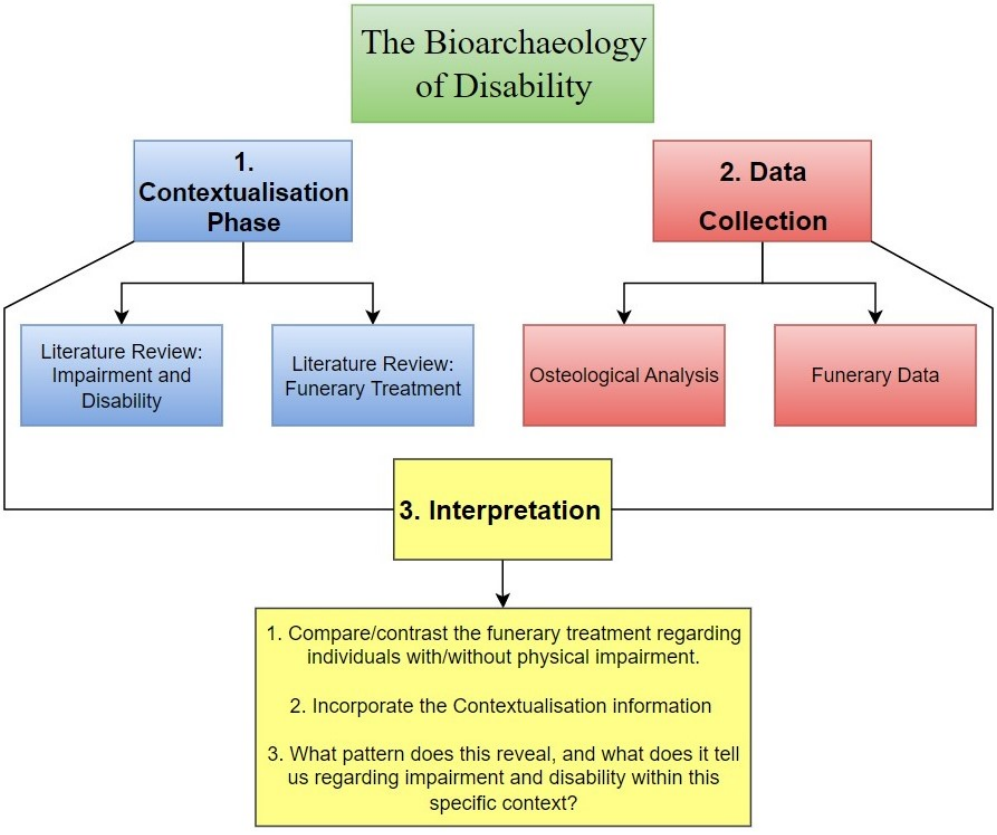

Figure 4: Flowchart outlining the three main steps of the BoD.

Illustration made using draw.io https://www.drawio.com/

5.2 Identification of Physical Impairment:

The identification of physical impairment was done following standard paleopathological identification methods (Roberts & Connell. 2018). The study was conducted by performing a macroscopic inspection of the entire material.

One of the most important aspects is to be able to differentiate between ante- peri- and postmortem injuries, since this has major implications regarding the designation of an individual as physically impaired or not. This is done by observing if the healing process has begun (Roberts & Connell, 2018). Open wounds, for example, can be classified based on the sharpness of the edges. If the edges are rounded then it is a sign of healing and thus an antemortem injury. However, if the edges are sharp, it is an indication that the healing process has not yet started and thus the injury is either peri- or postmortem (Roberts & Connell, 2018).

5.3 Age Estimation:

This study utilizes the data collected by a previous study of the material. Sandra Fritz in her Master's thesis from 2021, titled "*Establishing the paleodemography of S:t Nicolai High Medieval cemetery - An evaluation study of the Transition Analysis 3 method"*, conducted a paleodemographic analysis of the skeletal material from S:t Nicolai. The study utilizes the newly developed TA3 method in order to gain more reliable data regarding the age-of-death of people from the S:t Nicolai skeletal material. The study analyzes the same 76 individuals that are part of this study which means that the data can be extracted and used here. This means that all the individuals in this study have their age estimated using one of the latest methods. No Kappa-test will be performed since no new measurements were taken.

5.4 Sex Estimation:

Similar as in chapter 5.3 this study will utilize the data collected from previous work. The same study will be utilized since it also contains data for sex estimation for all the individuals that are analyzed in this study. Following the example set by Bohlin, Croucher & Buckberry this study conducts a Cohen's weighted Kappa test on a random sample of 10 individuals (Bohlin, Croucher & Buckberry p. 78). This is done in order to establish if the already done sex estimations are concurrent with one's own judgment, and if it so it becomes possible to use the data without having to re-do the analysis of all 76 individuals.

The estimation of the sex for the 10-individual random sample was determined by primarily studying the traits of the pelvic bone according to Phenice (1969). Cranial traits were used secondarily following the standard set by Buikstra and Ulebaker (1994). Classification was done with the classes of; M, M?, Unclear, F? & F. The Kappa test gave a score of 1.0, which is translated as perfect agreement. Thus the data from Fritz (2021) can be used with confidence.

5.5 Stature Estimation:

Estimation of stature was done by measuring the maximum length of the right femur (White et al., 2012 p. 418-419). In cases where the right femur was in an inadequate condition, or missing, the left femur was measured. Measurement was done by following the standard set by Sjøvold (1990) and is calculated by the following equation:

(2.71 x the length of the femur) + 45.86 = stature +/- 4.49 cm

6. Contextualization Phase:

6.1 Impairment and Disability in Medieval Europe:

6.1.1 Law Codes:

An important source that can be utilized in order to study the view of different impairments is medieval law codes. A specific set of laws that are especially useful are those concerning the compensation values of various violent injuries (Bohling, Croucher & Buckberry, 2022 p. 82). These are laws that grant victims of violent injuries monetary compensation, paid by the perpetrator, for being subject to such trauma. Certain injuries are valued higher when compared to others and thus gives an indication to the wider social views of different injuries.

Denmark was during the Middle Ages divided into three separate jurisdictions; Scania, Zealand and Jutland, with each region having their own laws and assemblies (Tamm & Vogt, 2016 p. 3 & 11). *Codex Runicus*, as it is known today, is dated to around 1280 CE and had authority in Scania, which is of particular relevance in this study (Tamm & Vogt, 2016 p. 50). Scania, in this context, includes the provinces; Scania, Blekinge, Halland and the island of Bornholm (Tamm & Vogt, 2016 p. 45). Monetary compensation was the main form of criminal sanction, which could range between 3-40 marks (Tamm & Vogt, 2016 p. 33).

The *Codex Runicus* states the following concerning compensation for severe injuries

- 93. *If a man loses his nose, he takes as a full man's compensation. This also goes for the tongue, so also for both eyes and both hands and both feet. If a man loses one eye or one hand or one foot, he takes half a man's compensation. If a man loses his tools which are down his breeches, he shall have a full man's compensation; if he loses one of them he shall have a halfs man's compensation* (Tamm & Vogt, 2016 p. 72).

Thus, the more severe and impairing the injury was, the more compensation was awarded. An important aspect to note is the value placed upon the nose. More details are mentioned in the Law of Zealand, which dates to around 1240 CE (Tamm & Vogt, 2016 p. 113):

- *... But if it so happens that someone takes a free man and slices one nostril, then a quarter of a man's compensation shall be paid for it. But if he slices both nostrils of the man, then he shall pay half a man's compensations for it, because that is the mark of a slave and not of a free man* (Tamm & Vogt, 2016 p. 129).

Thieves could also in certain scenarios be punished by having their nose cut-off (Tam & Vogt, 2016 p. 36). Thus, the nose carried with it certain social connotations, and was therefore seen as particularly significant.

Maiming and the permanent loss of function is also mentioned in the *Codex Runicus*, which states the following:

- 94. *If another of a man's members (i.e besides those aspects that are mentioned in chapter 93) is maimed so that he has no use of it, he who maimed shall pay half as much for it as if it had gone entirely* (Tamm & Vogt, 2016 p. 72).

Thus, the permanent loss of function was not valued the same as completely losing a limb, since such cases were only worth half as much. This sentiment is also present in the Law of Zealand (Tamm & Vogt, p. 177). However, this is not the case in the law of Jutland, ca 1240 CE, where a passage states the following regarding a permanent loss of function:

- *If a man's limb becomes maimed and still it is of some use so that he can bend and stretch it, then it shall be paid for with as much as is valued by reliable men.*
  But if it becomes dead and of no use, then it shall be paid for just as if it had been fully cut off (Tamm & Vogt, 2016 p. 283).

A similar sentiment as the one expressed above is also present during the same time frame in neighboring Sweden (Ekholst, 2021 p. 49). This highlights that there existed some differences between the various legal provinces in medieval Denmark, even if they in most cases share the same general sentiment (Tamm & Vogt, 2016 p. 11).

Another important variable was regarding the visibility of the injury. The *Codex Runicus* states the following:

- *... It is also thus as to a man's ear and as to his toes and all those body parts that can be covered with his hair or with his clothes: then shall be paid with is most worth, wound or maiming, Maiming shall be paid according to good men's estimate, as much as they decide for compensation* (Tamm & Vogt, 2016 p. 72).

The Law of Jutland goes into more detail regarding the apparent visibility of various injuries:

- *For all the wounds that one cannot hide with clothes or with hair, such as wounds to the face or to the hand, for that is always paid half again as much as for other wounds. But if there is maiming, such as there is if the mouth becomes distorted or the eyes or the nose, then it is valued by good men, and compensation shall be paid accordingly* (Tamm & Vogt, 2016 p. 284).

A similar sentiment regarding visibility is also present at the same time in neighboring Sweden (Ekholst, 2021 p. 50). Thus, not only was loss of limbs and bodily function an important factor, but also the aesthetic visibility. This indicates that impairments on highly visible areas, such as on the face or hands, would be considered worse, while impairments and wounds in more secluded areas, that are covered by things such as hair and clothing, would be less so.

An particularly insightful law code is from Gulaþingslög, the Norwegian law code from the Gula Assembly, dated to 1250 CE, with roots from the eleventh century, which states:

- *"§179 Concerning maiming. Now, if the hand is hewn from a person or a foot, then that shall be paid for with a half wergeld. But, if it remains hanging, then the half-wergeld hangs with it. And, if an eye is struck from a person's head, that is a half wergeld. But, if a person's hands and feet are both hewn away, then he is worse off living than dead and shall be compensated as if dead."* (Lawing, 2021 p. 54).

Wergeld is monetary compensation given during killing cases and would, according to the comparable Icelandic law code Grágás, amount to 16 marks (Lawing, 2021 p. 56). This figure is much higher than that of "full-compensation", which involved 6 marks, and was given in injury- and insult cases (Lawing, 2021 p. 56). This shows that severe enough impairments could legally be viewed the same as if the individual was dead. A person with no hands or feet, as the law uses as an example, would struggle to perform most forms of physical labour and would require extensive care. To consider the person dead gives an indication towards the societal view of such heavily impaired individuals.

Similar injury and impairment laws, as these in medieval Denmark, Norway and Sweden are also present in law codes from other parts of Europe, for instance in England, Wales, Italy, Francia, Frisia, Byzantium and Cyprus (Skinner, 2017 p. 233-244).

Even though it might seem that purposefully causing an impairment was generally frowned upon, it could however, in some cases, be carried out legally as a form of punishment for committing a certain crime (Metzler, 2013, Skinner, 2017 p. 72). For example, thieves in medieval Denmark were required to return any stolen goods and in addition pay a fine worthy twice of the goods value (Tamm & Vogt, 2016 p. 36). However, if the value of stolen goods amounted to less than half a mark then, as an addition, the thief would be permanently marked by the either amputation of the nose or the ears, or by whipping of the back until the skin falls off (Tamm & Vogt, 2016 p. 36). Another similar example is also present in England under King Cnut (1016-1035 CE), where a law existed that sentenced women, who committed adultery, to forcefully have their nose and ears cut-off (Whitelock, 1979 p. 463). This particular law was clearly inspired by biblical passages from the Old Testament.

The link between law and biblical precedents were particularly apparent in the Byzantine law codes, which made purposeful mutilation a common punishment. For example, a common way political opponents were dealt with was by blinding and nose-cutting (Skinner, 2017 p. 75). The most famous example of this involves the Byzantine emperor of Justinian II, who after having been deposed of the throne, in 695 CE, had his nose cut-off. When he later returned to the throne, in 705 CE, he was still depicted on coins with his nose present (Skinner, 2017 p. 21). Sources from the 9th century state that he wore a prosthetic made out of gold to cover his nose (Skinner, 2017 p. 75). These attempts to cover-up his injury indicate that he felt a sense of shame about his condition and thus actively tried to hide it from the

general public. Another famous example, of a person hiding a nasal injury, involves the Danish astronomer Tycho Brahe (1546-1601). Tycho and another fellow student had a slight disagreement and decided, as intellectuals do, to calmly solve the issue by engaging in a sword fight (Guyomarc'h et al., 2018). The subsequent fight resulted in Tycho losing a part of his nose. This event would cause him to carry a prosthetic over his nose, allegedly made out of gold and silver (Guyomarc'h et al., 2018). The hiding of nasal injuries is thus a well established phenomenon that would continue for millena, and indicates the shame and ridicule associated with it. This was particularly the case in medieval Denmark, where nose-cuttings were heavily fined due to the culture annotations associated with it, and as such it were seen as particularly shameful (Tamm & Vogt, 2016 p. 34 & 129).

Because of the existence of lawful mutilation and disfigurement, it was of utmost importance for innocently impaired people to prove that they were not criminals. For example, a man named John De Roghton, who lived in England during the reign of Edward I (1239-1307 CE), accidentally lost his left ear, due to getting kicked by a horse (Metszler, 2013 p. 30). In order to not be confused with that of a criminal he obtained a certificate, which stated clearly that his impairment was not the result of lawful punishment (McCall, 1979 p. 76). This issue, regarding confusion with criminals, would plague impaired people for many centuries, with many similar examples being present throughout the entire Middle Ages and all over Europe.

6.1.2 Religious view on impairment and disability:

Another important source of information is from various contemporary religious and theological texts. Studying and comparing religious sources reveals a complex view of disability that changes with time and oftentimes is contradictory in nature.

The Norse religion, which was the main religion in Scandinavia before Christianity, had a complex and often contradictory approach towards impairment. For example, norse sources state that the purposeful mutilation of an opponent, i.e. inflicting a permanent and possible impairing injury, was the ultimate form of humiliation (Lawing, 2016). Although, according to the Hávamál, a poem within the Poetic Edda, impairment would still be preferable to death (Bergqvist, 2013 p. 149). Verse 71 of the Hávamál states the following:

- *"A limping man rides a horse, a one-handed man drives a flock, a deaf man fights and wins; it's better to be blind than burnt; no one has use for a corpse."* (Pettit, 2023 p. 95)

This passage makes it clear that impaired people could still find purpose and be useful in different areas. Although it must be noted that being valued higher than that of a corpse is not that big of a compliment when all things are considered.

However, this mainly negative view is challenged by the fact that many of the most important characters in norse mythology are physically impaired. For example; Odin the all-father, with the loss of one eye, is half-blind, the god Týr is one-handed and the god Hödr is described as being blind (Bragg, 2004, Ekholst, 2021 p. 39). The *Sturlunga saga* mentions multiple powerful chieftains and landholders who despite having cleft palates, withered hands and slack feet respectively still keep their high social status (Lawing, 2013 p. 133, Ekholst, 2021 p. 39). Other famous Norse characters, like Ivar the Boneless, whose epithet meaning is still up for debate, indicate that physical impairment, or at the very least "*otherness*" did not automatically lead to a relegation in social status.

Since the understanding of disability in medieval Scandinavia is quite limited it is possible that some of these earlier Norse views were still in circulation among the population despite the conversion to Christianity (Ekholst, 2021 p. 39). More studies comparing burial treatment of impaired and non-impaired individuals from previous Norse areas with none-Norse areas needs to be done in order to see if there is any significant difference and if such a difference can be attributed to the Norse heritage.

With the introduction of Christianity to Scandinavia the religious view of impairment changes, although the complexities and the contradictory nature remain. The most important source for the Christian view of disability is the Bible. The Bible generally espouts a message of love, compassion, humbleness and treating everybody equally, for example the golden rule. However, there are multiple episodes in the Bible with the involvement of disabled people where this seemingly is not the case (Metzler, 2006 p. 38). The most common types of impairments that are mentioned in the Bible are; blindness, deafness, dumbness, leprosy and paralysis (Otieno, 2009). Impairment, and diseases in general, is often seen as the result of divine punishment. Some examples of biblical passages that highlight this is found in Deuteronomy 28-29:

- 28:28: "*The Lord will afflict you with madness, blindness and confusion of mind*."
- 28:60: "*He will bring on you all the diseases of Egypt that you dreaded, and they will cling to you.*" (BibleGateway, ND Deuteronomy 28-29)

Ohry and Dolev, in 1982, made an medico-historical analysis of all mentions of physically impaired people in the Old Testament and they conclude that:

- "*Our observations show that disabilities are presented as dive punishment for human misdeeds, while compliance with the religious and moral laws will improve or heal physical handicaps*" (Ohry & Dolev, 1982, p. 63).

The view of linking sin and impairment is today known as the religious model of disability (Otieno, 2009). Only once the soul has been cleansed from sin, the true cause of an impairment or disease, can the body begin to heal. This view acts as a mechanism to keep impaired people attached to the church, in search of a vain hope for a cure to their particular ailment (Wheatley, 2010 p. 12).

An interesting observation is that there is a clear difference between the New- and Old Testament regarding when and why disabled people are mentioned (Metzler, 2006 p. 38). Impairments in the New Testament are often presented in the context of various healing miracles performed by Jesus, or by one of his apostles (Metzler, 2006 p. 41). For example, in John chapter 5, Jesus heals a crippled man at the pool of Bethesda. When Jesus later meets the man again the following interaction occurs:

- *"Later Jesus found him at the temple and said to him, "See, you are well again. Stop sinning or something worse may happen to you"* (BibleGateway, N.D, John 5:19)

Another difference is that the notion of linking sin and impairment is not as rigorously followed in the New Testament, which can be seen in, for example, John chapter 9:

- *"As he went along, he saw a man blind from birth. His disciples asked him, "Rabbi, who sinned, this man or his parents, that he was born blind?"*
  "Neither this man nor his parents sinned,"said Jesus,"but this happened so that the works of God might be displayed in him." (BibleGateway, N.D, John 9 1:4).

The link between sin and impairment seems not to be absolute, at least when it comes to the New Testament (Metzler, 2006 p. 42). This seemingly inconsistent link between impairment and sin had an impact on medical practices during the Middle Ages. The fourth Council of the Lateran, in 1215 CE, passed the canon law 22 which states (Bergqvist, 2013 p. 113):

- *"As sickness of the body may sometimes be the result of sin — as the Lord said to the sick man whom he had cured, "Go and sin no more, lest something worse befall you"*

*— so we by this present decree order and strictly command physicians of the body, when they are called to the sick, to warn and persuade them first of all to call in physicians of the soul so that after their spiritual health has been seen to they may respond better to medicine for their bodies, for when the cause ceases so does the effect." (*Papal Encyclicals Online, 2020)

The law clearly takes John chapter 5:19 as inspiration, however, it also states "*sickness of the body may **sometimes** be the result of sin*", which indicates that they took into account the uncertainties present in the New Testament (Metzler, 2006 p. 47).

Sickness, in the context of Medieval Scandinavia, also included fractures and other forms of trauma induced wounds, since no clear distinction was drawn between injury and disease (Bergqvist, 2013 p. 134-135). Henri De Mondeville, a french surgeon living between 1260-1320 CE and gives some rare insight into the view of sickness from ordinary people, at least when it comes to medieval France:

- "*The common people customarily divide diseases… into those which arise from a cause and diseases which have no cause, or are caused by spells. They say that a disease has a cause when the latter is extrinsic, exterior… like a stick, a stone, a knife or something else of that kind… They say that the disease has no cause or is caused by spells, when it results from an intrinsic, interior causes…*"
  - Henri De Mondeville (Metzler, 2006, p. 72.)

Sickness and impairments that appear to have no real apparent cause, for example congenital birth defects and many diseases, would form their own separate category and be viewed with more mythicism and confusion. Wounds and injuries, which can be easily linked to a particular event or action, would form its own category and be more self-explanatory.

An important source regarding discriminatory practises towards impaired people is found in the in Leviticus 21, from the Old Testament, which concerns the involvement of impaired people within the priesthood (Metzler, 2006 p. 40):

- "*And Jehovah spake unto Moses, saying, Speak unto Aaron, saying, Whosoever he be of thy seed throughout their generations that hath a blemish, let him not approach to offer the bread of his God. For whatsoever man he be that hath a blemish, he shall not approach: a blind man, or a lame, or he that hath a flat nose, or anything*

superfluous, or a man that is broken-footed, or broken-handed, or crook-backed, or a dwarf, or that hath a blemish in his eye, or is scurvy, or scabbed, or hath his stones broken; no man of the seed of Aaron the priest, that hath a blemish, shall come nigh to offer the offerings of Jehovah made by fire: he hath a blemish; he shall not come nigh to offer the bread of his God. " (BibleGateway, N.D, Leviticus 21 16:22).

This passage seems to be, and has been heavily cited as, proof of systemic discrimination by the church towards impaired people, which would make them disabled in this context. However, a law is only as powerful as the willingness is to enforce it, which is a major question in this instance. For example, the *Apostolic Constitutions*, dated between the 4th-6th century, section 8 paragraph 77-79 states that:

- "77. *If any one be maimed in an eye, or lame of his leg, but is worthy of the episcopal dignity, let him be made a bishop; for it is not a blemish of the body that can defile him, but the pollution of the soul.*
- 78. *But if he be deaf and blind, let him not be made a bishop; not as being a defiled person, but that the ecclesiastical affairs may not be hindered.*
- 79. *If any one has a demon, let him not be made one of the clergy. Nay, let him not pray with the faithful; but when he is cleansed, let him be received; and if he be worthy, let him be ordained*." (Donaldson, 1886, New Advent, N.D)

The *Apostoilc Constitutions* had authority in Roman Catholic Canonical Law and clearly contradicts parts of Leviticus 21 (Bredgren, 1999 p. 193). However, this law was later in turn contradicted by the *Liber extra*, a collection of canonical documents from 1234 CE issued by pope Gergory IX (Friedberg, 1881, Metzler, 2006 p. 40). These documents made it clear that physical deformity, mutilations and other serious blemishes disqualified a person as a potential candidate for higher order. The text states "higher order", which might indicate that lower positions were not subject towards these strict conditions (Metzler, 2006 p. 41). Thus, the implementation of Leviticus 21 seems to have been fluid and could often change depending on the authority in charge at the time.

Disqualification for a position could, nonetheless, be overturned by the granting of a dispensation. Examples of this are present in the *Liber extra,* the text mentions the granting of dispensation for an abbot with mutilated hands (Metzler, 2006 p. 274). Exactly how common dispensation was, what type of impairments were accepted and how often it was requested is

still unknown and can only be speculated. One could speculate that class and social status likely played an important role regarding who was granted dispensation and who subsequently was denied.

Another important source for the Christian view of disability is the various theological debates within the church. One such debate is concerning the state of the human body after resurrection in heaven. This debate traces its origin from the biblical passage, 16:10, in the Old Testament which states (BibleGateway, N.D):

- "*For thou wilt not leave my soul in hell; neither wilt thou suffer thine Holy One to see corruption*" (Psalm 16:10).

This was initially interpreted as that God would not allow saints to suffer at decomposition (Metzler, 2006 p. 56). This passage was, throughout the centuries, heavily debated and discussed until it was eventually extrapolated, by Saint Anselm (1033-1109 CE), into meaning that any person that enters heaven will do so "*whole and uncorrupted*" (Metzler, 2006 p. 56). He states:

- "*There shall be none blind, lame or defective; only those physical imperfections remains, such as the scars inflicted on martyred saints, which were sustained in pursuit of a righteous life (but such defects shall remain as would redound to the glory of the elect), though in general everyone in heaven will be healthy, and will suffer no pain, discomfort or unease."* (Hughes, 1968 p. 109).

This notion of resurrection raises many questions regarding the relationship between body and identity, and would have had a profound impact upon impaired people. This notion would also create a two-tiered system in heaven, with martyred saints still keeping their scars and injuries and everyone else being "normal" and healthy. An example of such a saint is S:t Franciss of Assi (1347-1380 CE), the founder of the Franciscan order, a sub-group within the Mendicant Order (Dickason, 2022 p. 36). During his life he received numerous scars that became symbols of excellent sainthood and closeness to Christ (Dickason, 2022 p. 37). Depictions of S:t Franciss are therefore often made with his scars prominently displayed, as opposed to concealing and hiding them. Thus, scars and other forms of impairment could, in elite religious circles, be viewed as something positive and worthy of celebration. In other, seemingly among more ordinary people, it would be filled with shame and should be hidden, and in heaven even forgotten.

All of this seemingly indicates that a fairly negative attitude existed towards impaired people within the Christian worldview. However, an important aspect that needs to be mentioned is the concept of charity work, which was often performed by different Christian convents. Medieval sources often cited Jesus's words from Matthew 25: 35-36 as the reason for conducting charity, since the passage states (Davis, 2014 p. 936):

- *"For I was hungry and you gave me nothing to eat, I was thirsty and you gave me nothing to drink, I was a stranger and you did not invite me in, I needed clothes and you did not clothe me, I was sick and in prison and you did not look after me."(Matthew 25: 35-36 BibleGateway, N.D)*

The poor and needy became identified with that of Jesus Christ, thus helping such people was seen as helping Jesus himself (Davis, 2014 p. 936). Christian charity was already present as early as the 4th century Roman Empire, however, the 12-13th century saw what scholars refer to as a "charitable revolution" (Davis, 2014 p. 935). The timing of this is probably related to an increase in population, urbanization and social stratification (Metzler, 2013 p. 166). Impaired individuals could through convents receive care and alms (Davis, 2014).

An important question to keep in mind when discussing all of these religious sources is how much of these views and debates actually concern the average person at the time, rather than just being an area of debate for the literate and religious elite. Thus it is possible that there was quite a large gap between, for instance, an archbishop and an ordinary person's view of impairment and subsequently disability.

6.2 Burial practices in Medieval Scandinavia

The Christianization of Scandinavia during the 10th- and the 11th century brought with it major changes to the social and cultural organization of society. An aspect that saw a major change was the burial practices. Pre-Christian Scandinavia placed a great deal of social importance upon the individual grave, both in terms of grave-goods and its physical appearance (Andrén, 2000 p. 23). This changes with the introduction of Christianity, when burials become more rigid and uniform.

A fundamental part of Christian theology is the concept of resurrection, with the resurrection of Jesus Christ as the main motif. This altered the view of the grave, as it became primarily seen as an temporary resting place for the soul, thus making preservation of the body, and the

location of the burial, a much more important matter when compared to the pre-Christian society (Mejsholm, 2009 p. 44). This can be seen in the disappearance of cremation burials, and the importance in placing the body in a strict and particular fashion. The body should always be laid on the back and the grave itself should be orientated with the head to the west and the feet to the east (Mejsholm, 2009 p. 44). This is because Christians believe that the second coming of Jesus would occur during dawn, and thus all the dead people should be ready to face Him when that day arrives (Mejsholm, 2009 p. 44). The rigidness of medieval Christian burials can be demonstrated by the fact that arm-positioning can be used as a method for dating (Mejsholm, 2009 p. 44, Redin, 1976 p. 32-33).

This uniform and rigid organization of burials has the consequence that there are few unique differences between individuals (Mejsholm, 2009 p. 204). The main differentiation that is used to differentiate social status is spatial location. The closer a burial is to the church, and to the sacred aspects within it, the more prestigious it becomes. Andrén (2000) calls this "*The sacred as a spatial principle*", which was already present as a concept in the 4th century Roman Empire (Andrén, 2000 p. 7). The main attraction was not to be buried near the church building itself, but rather to the altar and the various relics and offerings during mass (Andrén, 2000 p. 8). Areas of the church, such as the choir, with its closeness to the altar, would therefore be the most valuable and thus reserved to the socially- and economically privileged in society. This is an important aspect to keep in mind in this study, in terms of finding evidence of discriminatory treatment and in turn disability.

The cemetery and its close connection to a particular church was also the case in medieval Denmark (Jensen, 2019 p. 112). This closeness stands in stark contrast to most religions, including that in pre-Christian Denmark, where burial sites are consciously separated from the religious temple and that of other buildings (Andrén, 2000 p. 8 & 23). There are very few examples, at least in a Danish context, where a Christian burial site is located without the adjointment of a church (Jensen, 2019 p. 112). People were therefore often buried in the cemetery that belonged to the church that they commonly associated with in life. However, it was possible, by the means of payment, to be buried in a churchyard of one's choosing, as was particularly the case with burial in S:t Nicolai (Jensen, 2019 p. 112, Andrén, 2000 p. 8).

7. Results:

Out of the total of 76 individuals, 8 show evidence of violence/injury induced physical impairment, which amounts to 10.5 % of all individuals. All of these individuals were buried with arm position B, i.e. dated between 1250-1350 CE. See, table 1, below for a summary. See chapter 11 Appendix, on page 77, for illustrations regarding the location of each burial.

Grave ID:	Sex, Age & Length*:	Physical Impairment:	Location:	Funerary treatment:
25	M, 53.0 + 5.06 cm	Partially healed trauma on parietale - acquired (medium term)	Choir	Normative
94	M, 40.6 -12.55 cm	Fractured proximal ulna, loose olecranon with signs of healing, deformed caput radii & osteophytes on distal humerus - acquired (long term)	Longhouse	Buried with an infant, a extra cranium and in an isolated spot
115	M, 37.9 -1.71 cm	Head trauma / brain herniation & Spina bifida on sacrum - acquired (medium term)	Northern cemetery	Buried in the "northern impaired cluster"
132	M, 56.5 -0.36 cm	Severe trauma on frontale, resulted in a visual deformity and probable blindness of the left eye - acquired (medium term)	Northern cemetery	Buried in the "northern impaired cluster"
153	M, 26.6 -4.42 cm	Radioulnar synostosis type 1 - acquired (long term)	Northern cemetery	Buried in the "northern impaired cluster"
197	M, 42.9 -1.71 cm	Osteomyelitis on distal right tibia - acquired (long term)	Northern cemetery	Buried in an isolated spot in close proximity to a child
206	M, 66.6 -5.78 cm	Wound on frontale, did not result in a cracked open the skull - acquired (medium term)	Northern cemetery	Normative
323	M, 67.7 +15.90 cm	Fractured dexter caput femoris resulting in arthritis, misalignment and a decrease in overall femur length by 1 cm - acquired (long term)	Northern cemetery	Buried in the "northern impaired cluster"

Table 1: A brief summary of all individuals with physical impairment with information concerning age, sex, length (delta from average male height), paleopathology, location and funerary treatment.*

Funerary Treatment in S:t Nicolai:

The normative-funerary treatment in S:t Nicolai, from 900-1350 CE, follows standard Christian burial customs, like for instance that all individuals are placed in an west-east direction. Grave goods are a rare-occurrence, being present in 16 out of the 76 burials, which accounts for 21 % of cases. The remains of coffins are also rare and only occur in 20 burials, i.e 26 % of the time. Furthermore, the material is divided between three separate areas, all with different exclusivity; the choir, the longhouse and the northern cemetery. Thus, both the demography and prevalence of grave goods and coffin remains differ quite significantly between the different areas. However, there are two individuals, Grave ID 405 & 520, who are located at an unknown location. Both are male and neither contain grave goods, however, Grave ID 405 has remains of a coffin, in the form of a nail.

The Choir:

The choir, being the most prestigious part of the entire S:t Nioclai complex and has the most exclusive burials. There are in total 10 burials, with 9 being estimated as male and 1 female. Grave goods are present in 6 out of the 10 burials i.e. 60 % of the time, which is by far the highest percentage in the entire complex. The grave goods come in the form of; a silver coin/button, multiple iron buckles and a seal stamp. The remains of coffins also stand out here, with it being present in 6 out of 10, i.e 60 %, of burials. These remains are in the form of spikes and wooden boards.

The Longhouse:

The longhouse is the second most prestigious part of the complex and contains 13 burials, of which 9 are male, 2 female and 2 children. Grave goods are present only in 3 burials, i.e 23% of the time. The grave goods here are listed as 2 bronze fragments, a piece of ceramics, half a seal stamp, a needle and a coin. Coffin remains are also quite rare, with it only being present in 3 burials out of the total 13, i.e 23 % of the time. The remains come in the form of nails and a foot niche. Two of these 13 individuals are buried in the northeastern corner, which has been identified as a chapel. Both these individuals are estimated to be male and have neither grave goods nor coffin remains present in their graves.

The Northern Cemetery:

The biggest, but least prestigious, area is what is referred to as the northern cemetery, which contains 44 burials. The demographic is made up of ; 22 males, 5 males with a question mark,

10 females, 6 children and one unknown due to taphonomy. Grave goods are present in 7 burials, which accounts for 16 % of the time. The grave goods come in the form of; iron buckles, coins, spikes, a bronze tip and pilgrim marks. The remains of a coffin is present in 9 burials, which accounts for 20 % of the time. The remains come in the form of a wooden board and colored soil from wood and nails. A further 7 individuals have been classified as northern cemetery but with an added question mark. Of them are 4 male, 2 male with a question mark and one child. None of these graves contain grave goods, however, one have the remains of a coffin, in the form of a wooden board.

Stature Estimates:

The result regarding stature estimation revealed that the average length, on A-B individuals, in S:t Nicolai is 169.68 +/- 4.49 cm. The average length for males-only is estimated to be 172.23 +/- 4.49 cm, whilst female-only is 160.13 +/- 4.49 cm. The tallest individual is Grave ID 323, with a total stature of 188.1 cm +/- 4.49 cm, whilst the smallest is Grave ID 303 and measures in at 151.6 cm +/- 4.49 cm. For a clearer visualization and comparison see figure 5 below.

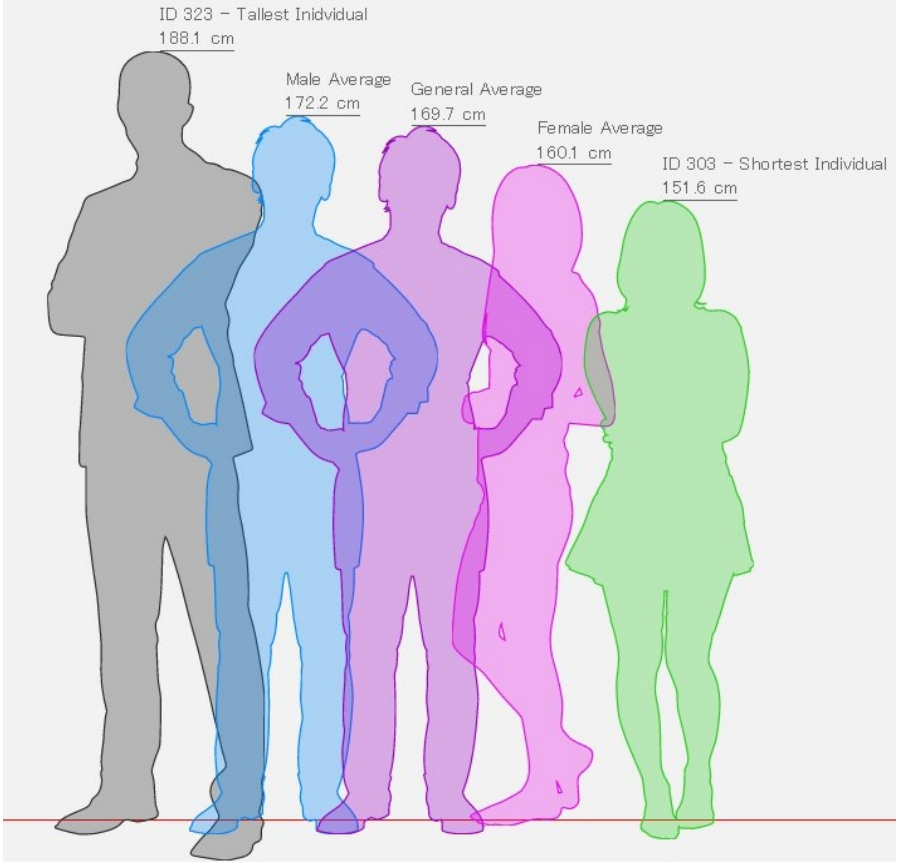

Figure 5: Visualization of stature in the S:t Nicolai material, with A-B arm positioning. Illustration made using Hikaku sitatter - height comparison chart: https://hikaku-sitatter.com/en/

Previous studies on skeletal material from medieval Helsingborg have also conducted estimations on stature. Estimates on individuals encompassing the period between 1050-1500 CE arrived at the conclusion that the average height for males-only was 172.1 cm, whilst for females-only it was 161.3 cm, see figure 6 below (Arcini, 2020 p. 87).

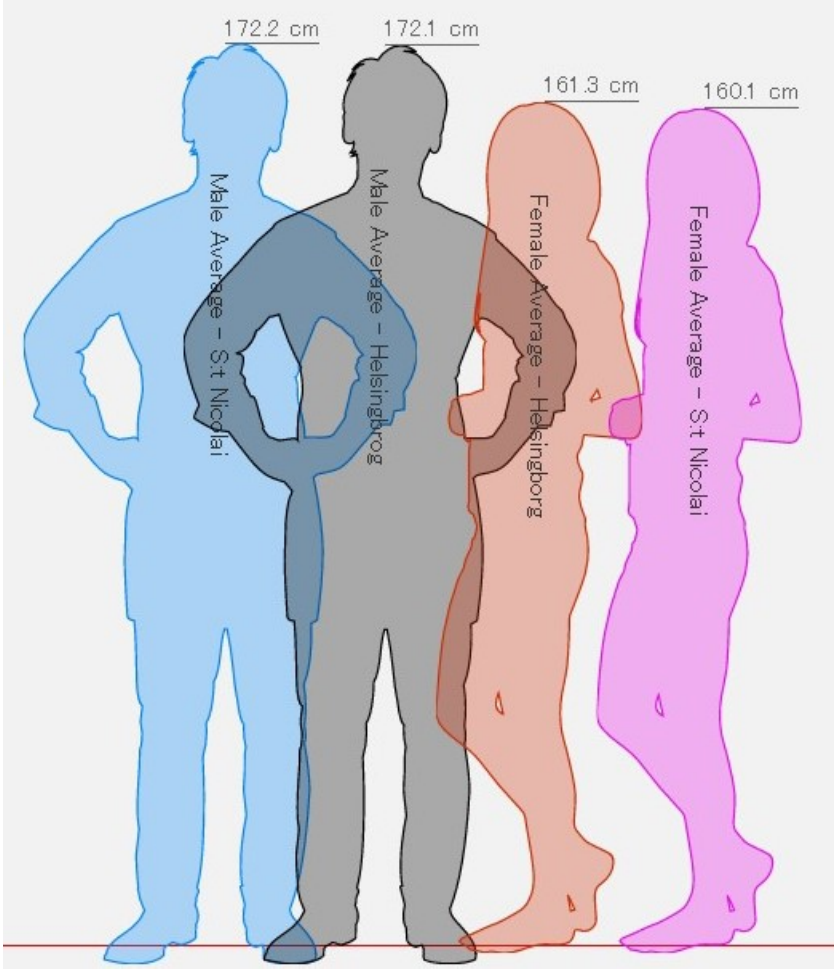

Figure 6: Comparison in height between Helsingborg and S:t Nicolai.
Illustration made using Hikaku sitatter - height comparison chart: https://hikaku-sitatter.com/en/

Thus, the individuals in S:t Nicolai follow a similar pattern as their fellow contemporaries in the wider population of medieval Helsingborg. The males in S:t Nicolai are on average 0.1 cm taller, however, this falls well within the potential room-of-error. The females are 1.2 cm on average shorter than their female contemporaries, but this too falls within the potential room-of-error and should therefore be highlighted cautiously. Another fact that needs to be taken into account is that the study by Arcini (2020) involves a larger sample size and encompasses a longer period of time. Thus, the result might be different if only the individuals from 1050-1350 CE are accounted for.

7.1 Impaired Individuals with Normative Treatment:

- **Grave ID: 25**

This individual is estimated to a age-of-death of 53 years old and identified as belonging to the male sex. The grave is located in the choir near the southern edge. It contained one silver coin/button and one bronze pearl. The remains of a coffin in the form of multiple nails was also found. These finds follow the patterns of the other graves found in the choir. The right femur is measured at 48.5 cm, which translates to 177.29 +/- 4.49 cm, which is 5.06 cm taller than the average male.

Physical Impairment:

The dexter side of parietale has a chop mark in the process of healing, see figure 7 below. The wound shows clear signs of healing with curved edges. The wound however is not completely sealed and would thus have been vulnerable to potential infections. The wound itself is quite small, measuring in at 23mm in breadth and 41 mm in length, and thus any potential scar could actively be hidden by either hair and/or headwear. The part of the skull that has been impacted protects the part of the brain known as the parietal lobe. This part of the brain is responsible for sensory perception and integration (Brain Injury Minnesota, 2015 p. 3). The parietal lobe is divided into two halves, a left and a right side. Injuries on the left side can disrupt a person's ability to understand written and/or spoken language, whilst the right side, which is where this injury is located, can cause, for example visuo-spatial deficits and contralateral neglect (Brain Injury Minnesota, 2015 p. 1). Exactly what, or if any, mental impairment this would have caused is difficult to conclude. Thus, it is likely that this individual only have an aesthetic impairment.

Figure 7: Note the healed but not completely sealed wound to the southwest of the larger hole. The larger hole is post-mortem. The figure on the right is zoomed in upon the wound.

Grave ID 206:

This individual is identified as a 66.6 year old male and was buried at the southeastern corner of the northern cemetery. This burial is thus one of the closest burials in relation to the church whilst simultaneously still being buried in the northern cemetery. He is not buried in an isolated place, since there are four other individuals with A-B arm positioning within close proximity, two male and two female. The burial itself contained neither grave-goods nor remains of a coffin, which is also the case for the other four burials in the vicinity, thus meaning that he does not stand out. The length of the left femur is measured at 44.5 cm, which is translated to a total stature of 166.45 +/- 5.78 cm. This would make him 6.15 cm shorter than the average male.

Physical Impairment:

Grave ID 206 has a large wound on the frontal bone, see figure 8 below. The wound has a breadth of 14 mm and a length of 46.5 mm. There are no signs of fracture or healing on the inside, thus indicating that the injury did not crack open the skull and directly impact the brain. Thus, the result of this injury would most likely only be an aesthetic impairment, and most likely not cause any cognitive impairment. The wound is located on a discrete enough location that it could be easily covered up by either hair or headwear.

Figure 8: Healed wound on frontale

7.2 Impaired Individuals with Non-normative Treatment

- **Grave ID 94:**

This individual is estimated to have died at the age of 40.6 and is assessed as being a male. The grave was located in the northwestern part of the longhouse in an isolated part of the cemetery and contained neither grave goods or coffin remains. Two other things that make this burial stand out is the presence of an infant and the inclusion of an extra cranium placed between the legs. The cranium, however, might belong to an individual that was buried later, since Grave ID: 97, with arm position D, is buried in close proximity. The length of the right femur was measured to 42 cm, which is estimated to be 159.68 +/- 4.49 cm, thus he would have been 12.55 cm shorter than the average male.

Physical Impairment:

This individual has a severe fracture of the right proximal ulna. The caput ulna has completely separated from the rest of the bone. Both the caput and the diaphys show extensive signs of healing, thus proving that the fracture is antemortem, see figure 9 below. Dexter radius also shows signs of deformation on the caput. The dexter caput has a diameter of 27 mm, compared to sinister at 20 mm. Dexter humerus also has osteophytes present on the trochlea where the radius would have been articulated, see figure 10 on page 45.

Figure 9: Right ulna with loose Olecranon, signs of healing on both caput and diaphysis. The radius closest to the ruler, in the top right corner, has a deformed caput radii and is slightly longer. The bottom two pictures show the loose olecranon.

Figure 10: The humerus to the right shows osteophytes on the trochlea.
Same humerus that would be articulated with the injured radius and ulna.

The impact this would have had on this individual's life is that he would have struggled to properly use his right arm.

Grave ID 115:

This is a male estimated to have died at the age of 37.9. This individual was buried in what is now known as the "northern impaired cluster" along with four other impaired individuals (Grave ID; 132, 153 & 323). He is the second northwesternmost burial, and therefore is second furthest away from the church. The grave contained no grave-goods or remains of a coffin. The length of the right femur is measured to 46 cm, which would make him have a stature of 170.52 +/- 4.49 cm. This is 1.71 cm shorter than the average male height.

Physical Impairment:

The individual has a large open wound at the back of his head, on the occipital bone. The edges of the wound are rounded which indicates that the healing process has started. The wound is not sealed and would thus pose an increased risk for infections. The hole is 15.5 mm in breadth and 25.5 mm in width, see figure 11 on page 47. The cause of the wound is not entirely clear. It could be the result of violet trauma, however, the presence of spina bifida on sacrum indicates that it might be due to arachnoid cyst or brain herniation, see figure 12 on page 47 (CHOP, N.D).

Spina Bifida is a type of neural tube defect (NTD) that develops during the first few weeks of pregnancy (CDC, 2020). The closure of the neural tube usually occurs by the 28th-day after conception. However, individuals with Spina bifida have a section of the neural tube that does not close or properly develop (Mayo Clinic, 2022, Lewis, 2019 p. 594). There are two main types of Spina bifida, which are categorized based on when during neurulation it occurs and the severity of the condition (Kumar & Tubbs, 2011). Spina bifida that develops during the primary stage of neurulation, i.e during the stage when the brain and neural cord is developing, usually results in more severe symptoms including, but not limited to; neurological impairment, lower-body paralysis and potential fatality, and is referred to as Spina bifida cystica (Mayo Clinic, 2022, Lee, 2022. Zou et al, 2020). Spina bifida during the secondary part of neurulation is known as Spina bifida occulta and is usually less severe, like for example causing a birthmark or a dimple, and often results in no symptoms at all (Barnes, 1994, Mayo Clinic, 2022).

Assessing the impact of Spina bifida in archaeological material is notoriously difficult (Lee, 2022). This is because there exists no diagnostic difference between Spina bifida cystica and Spina bifida occulta (Lee, 2022 p. 14). The main criteria for differentiation in the medical world is made on soft tissue, which is something that can not be assessed on skeletal remains (Lee, p. 14, 2022). However, the severe conditions associated with cystica, like neurological impairments and a higher risk of infections, make it so that childhood mortality, especially in the past, would pose a significant risk (CDC, 2020, Lee, 2022 p. 13). Prenatal individuals are especially vulnerable to taphonomic degradation and are therefore less likely to be recovered during archaeological excavations. The archaeological record would therefore be biased towards the discovery of individuals with occulta, the less fatal type (Lee, 2022 p. 13). Considering the fact that this individual is estimated to be 37.9 years old, one could therefore speculate that he suffers from occulta and not cystica.

However, as previously mentioned, this individual has an open-wound on the occipital bone, which might indicate that he suffered from a more severe form of Spina bifida. Hindbrain herniation is a condition that has commonly been reported on children with Spina bifida myelomeningocele, which is the most severe type of Spina bifida and a sub-category within cystica (CHOP, N.D). The most common form of hindbrain herniation is Arnold-Chiari II malformation, which blocks the circulation of cerebrospinal fluid and causes hydrocephalus, which can cause brain damage (CHOP, ND). However, the skull does not have the

characteristics of hydrocephalus and thus it is considered to be highly unlikely. Other forms of cysts are more associated with the spine when it comes to Spina bifida. Therefore it is not possible to rule out the possibility that the wound is the result of a traumatic injury. The conclusion is that occulta is the most likely diagnosis.

The impact this would have had on this individual's life is somewhat hard to conclude. The Spina bifida itself might have had little impact upon his life, but the open and unclosed wound on the occipitale would pose a serious risk of infections, and potentially other brain impairments, which would most likely influence his quality of life.

Figure 11: Note the hole on the occipitale. The figure on the right is zoomed in on the wound.

Figure 12: Spina bifida on sacrum.

Grave ID 132:

This grave contains the remains of a male at the age of 56.5 years. Grave 132 is located in the northern impaired cluster, along with Grave ID; 115, 153 and 323. Another thing that makes this grave stand out is the finding of a coin, identified as Oscar 1 from 1857. Exactly where this coin was found is not mentioned in the report, and thus it is possible that it was found in the fill layer and not in the grave itself. If the coin was found in the grave, as a form of grave good, it would change the burial date by over 500-years. The arm positioning was also not entirely clear and was thus classified as B but with an added question mark.
The length of the right femur is measured to 46.5 cm which would translate to a height of 171.87 +/- 4.49 cm, which is 0.36 cm shorter than the average male.

Physical Impairment:

Grave 132 has a large wound present on the dexter side of frontale. The wound shows clear signs of healing with rounded edges. The size of the wound is 6 mm in breadth and 58 mm in length. The location of the wound probably caused blindness of the right eye and potential neurological impairments, see figure 13 on page 49.

The part of the skull that has been damaged protects the area of the brain known as the frontal lobe. The frontal lobe is one of the most important areas of the brain, since it is responsible for; voluntary movement, language, planning-ahead, memory, behavioral- and emotional center, self-monitoring and personality (Queensland Government Health, 2022). The severity of the injury present in this individual has penetrated the skull and would most likely have resulted in damaging this part of the brain. Any damage towards the frontal lobe, known as frontal lobe syndrome, can have a multitude of different consequences, including, but not limited to; paralysis, inability to complete a sequence of complex tasks, Broca's Aphasia, inability to focus, emotional lability, difficulty problem solving, disinhibition, perseveration, adynamia, changes in behavior and even personality changes (Pirau & Lui, 2022, Queensland Government Health, 2022). It is not unlikely, given the severity of the impairment, that he suffered some sort of mental impairment as well, although it can not be confirmed to what extent. Any potential neurological impairments can only be speculated. The wound and the subsequent skeletal deformity would also have made him stand out from his fellow peers. The location of the wound is at such a visually apparent area that it would be impossible to conceal. All of these things combined would have had a severe impact upon this individual's life.

Figure 13: The facial wound on the right side of frontale from multiple angels.

Grave ID 153:

This grave contains the remains of a 26.6 year old male with. The grave was located in the northern impaired cluster, along with Grave ID; 115, 132 and 323. The grave contained no grave goods, however the remains of a coffin, in the form of a single nail, was discovered in the grave. The length of the right femur is measured to 45 cm, which translates to a total stature length of 167.81 +/- 4.49 cm, which would make him 4.42 cm shorter than the average male.

Physical Impairment:

This individual has radioulnar-synostosis on dexter radius and ulna. Radioulnar-synostosis is a condition that causes the unification of the radius and ulna, which has the consequence of eliminating rotational movement of the forearm, see figure 14 on page 51 (Elmahdi et al., 2022). This can both be congenital as a result of a birth-defect or as a consequence following an injury.

Congenital radioulnar-synostosis is a rare birth-defect and is a result of a failure of segmentation of the radius and ulna during embryological development (Simmons et al., 1983 p. 829). The upper limbs develop as a combined upper limb bud that later separates into three

separate elements; humerus, radius and ulna. During a brief period, after the development has reached a certain point, are the radius and ulna united by a common perichondrium at the distal end (Simmons et al., 1983 p. 829, Iseko, 2020 p. 1313). Genetic and teratogenic factors can interrupt the proximal radioulnar joint morphogenesis, which would later in development result in ossification and complete synostosis of the two elements (Simmons et al., 1983 p. 1313, Lewis, 2019 p. 609). The age of diagnosis is dependent on how severely the synostosis limits movement. The age ranges between 6-months to 22 years, with the average being at 6 years of age. Congenital radioulnar-synostosis also has a multitude of other impairments that are associated with it, for example hip dislocation, knee anomalies and clubfoot (Algabe et al., 2019). The presence of these types of impairments can not be confirmed in this specific individual, since the rest of the skeleton is in an extremely poorly preserved state. However, considering the fact that this unification has occurred on the distal end it means that this does not really matter, since the congenital explanation is not convincing enough.

Another, much more likely explanation, is post-traumatic. Radioulnar-synostosis can be developed post-traumatically, if the fracture heals in an incorrect position. Post-traumatic radioulnar-synostosis is divided into three distinct types based on where the synostosis has occurred; Type 1: occurs on the distal end, Type 2: occurs on the diaphysis & Type 3; on the proximal end (Elmahdi et al., 2022). Distal radius fractures are one of the most common fractures in adults today, which would also likely be the case in the past as well. Previous osteological research indicates that people at the time did not fully comprehend the importance in placing the bones in a correct position in order to minimize the risk of malunion (Bergqvist, 2013 p. 308). However, the research in this topic is divided among scholars, with others arguing that fractures often healed in a correct manner, thus proving that some general understanding of the phenomena was present (Bergqvist, 2013 p. 308).

The conclusion is therefore that this individual suffers from post-traumatic radioulnar-synostosis Type 1. This is primarily based on the location of the synostosis, at the distal end. This could be caused by, for example, accidentally tripping and using your hands to limit the impact of the fall. Such an action could easily result in a fracture of the wrist and subsequent healing could lead to radioulnar-synostosis. The unification is very robust which indicates that it has been present for a fairly long time.

Figure 14: Type 1 radioulnar-synostosis of right radius and ulna.

Grave ID 197:

This individual is identified as a 42.9 year old male and was buried near the southern edge of the northern cemetery in a relatively isolated spot, in close proximity with a child, aged 11-12. The remains of a coffin was found with the discovery of a spike. No grave-goods were discovered during the excavation. The length of the right femur is measured at 46 cm, which translates to a total stature of 170.52 +/- 4.49 cm, which is 2.08 cm shorter than the male average.

Physical Impairment:

This individual suffered from osteomyelitis on distal right tibia, see figure 15 on page 52. Osteomyelitis is a bacterial infection in bone that can be acquired through either the bloodstream or injury (Mayo Clinic, 2022, Roberts, 2019 p. 297). In adults it is often developed as a consequence of open bone wounds, for example by fractures or during surgery, when the inside of the bone is exposed to outside bacterial contamination (Petrone et al., 2015 p. 17). The most common bacterial cause for osteomyelitis is *Staphylococcus aureus*, which exists naturally inside the human nose and on the skin (Larsen, 2015 p. 87, Mayo Clinic, 2022). Infections, especially osteomyelitis, are one of the most serious consequences that can arise following a fracture (Petrone et al., 2015 p. 17, Urish et al.,

2020). It most commonly develops in the long bones of the legs, but it can theoretically infect any bone of the body (NHS, 2020). The symptoms of osteomyelitis are; severe pain and swelling of the infected area, fever, fatigue, osteonecrosis, septic arthritis, impaired growth and skin cancer (Mayo Clinic, 2022). Osteomyelitis can itself be fatal if the infection spreads via the circulatory system to other vital organs (Larsen, 2015 p. 88).

An important aspect that needs to be considered regarding osteomyelitis is that it can develop many years after an injury has occured (Larsen, 2015 p. 87). Acute-osteomyelitis develops within a range of days, however, it is also possible that a silent chronic version develops. This chronic version can persist inside the bone for many years without causing any symptoms. This silent version can become active years later, sometimes as a response to systemic or localized stress (Larsen, 2015 p. 87). This was the case, regarding an 56 year-old man in 2013, who 30-years after suffering a fracture of the left femur developed osteomyelitis (Ahmad et al., 2013). The outburst was triggered by a knee contorsion. Osteomyelitis can therefore develop in what visually looks like not-fractured bone.

Osteomyelitis can today be cured by a combination of surgery and strong doses of antibiotics, however, there is no guarantee for such treatment to succeed (Mayo Clinic, 2022, Petrone et al., 2015 p. 17). Any form of antibiotic treatment or advanced surgery would not have been available at all for people living in pre-antibiotic societies, such as the Middle Ages, and would therefore have been an even more dangerous disease (Petrone, 2015 p. 17). Painkillers, and splints if the leg is affected, are often given to patients today to ease the pain (Tidy, 2022). The disease would therefore have had an even more impairing impact in the past.

Figure 15: Distal right tibia with osteomyelitis.

Grave ID 323:

This grave contains the remains of an 67.7 year old man. He was buried in the northern impaired cluster, along with Grave ID; 115, 132 and 153. He is the northwesternmost burial in the entire cemetery and therefore is the individual that is furthest from the church. No grave goods or remains of a coffin were found during the excavation. The length of the right femur is 51.5 cm, however, an injury resulted in reducing its overall length. The left femur is measured at 52.5 cm and is thus more accurate in terms of estimating height. A femur length of 52.5 cm would translate to a total stature length of 188.135 +/- 4.49 cm. This would make him 15.9 centimeters taller than the average male and 4.06 centimeters taller than the second tallest individual in S:t Nicolai, with either A or B arm positioning. He would also be a whopping 36.58 centimeters taller than the shortest individual, ID 303, a female estimated to have died at the age of 59.3.

Physical Impairment:

This individual has a healed fracture of the right caput femoris. The injury has resulted in deformation of caput femoris, a reduction in collum femoris and a slight misalignment. The injury has also led to osteoarthritis on caput femoris. This is based on the presence of eburnation. The result of the deformed caput femoris can also be observed in the acetabulum, see figure 16 on page 54. The injured side has an V-shaped acetabulum while the other has a more normal shape.

Hip fractures are often associated with elderly people, since they are more likely to suffer from osteoporosis and thus have weaker bone density (Rikshöft, 2021). Hip fractures among younger individuals are often caused by high-energy impact events, such as for example falling from a great height or accidents in traffic (Rikshöft, 2021). Hip fractures are today treated with surgery. However, despite such treatment being available it still often causes severe pain upon movement. Mortality is also a possible consequence, especially among elderly people that already struggle with poor health. Individuals with an age over 80 have a 20 % mortality rate 4 months after surgery, whilst it is less than 3 % for individuals aged 15-59 (Rikshöft, 2021).

Considering that such modern surgery would not have been available during the Middle Ages, and the presence of eburnation which is an diagnostic criteria for arthritis, it indicates that he would most likely suffer severe pain upon movement and therefore struggle to

independently walk long distances. The slight misalignment of the femoral neck, as well as the overall shortening of the limb, would have made him have a limp as well and would thus have stood out among his fellow peers when walking.

Figure 16: Healed fracture of right caput femoris. Top left shows the difference between the right and left acetabulum. The right (located on the left side in the picture) has an V-shape while the left (located on the right side in the picture) has a more normative shape. Top right and bottom left and right shows the difference between proximal left- and right femur.

8. Discussion:

Physical impairment as a result of trauma is a condition that is present in 8 out of the 76 individuals in early- and high medieval S:t Nicolai, which amounts to 10.5 % of all individuals. This is a fairly large percentage considering that only traumatic impairments are considered in this study. A total of 6, out of the total 8, are buried in a non-normative manner, which amounts to 75 % of the time.

The normative treatment varies between the three burial areas of S:t Nicolai. The choir is the most prestigious area of S:t Nioclai, which is evident in the burial treatment among the individuals buried here, with 60 % of individuals here having grave goods and coffin remains. The presence of only 10 individuals in this part of the complex is also an indication of its exclusivity. The longhouse ranks second in terms of prestigiousness, and accordingly contains, percentage wise, the second most amount of grave goods and coffin remains, with it being present in 23 % of burials. The exclusivity is also ranked second, with 13 individuals being buried here. The last and least prestigious area is known as the northern cemetery. This is the largest, and thus the least exclusive, burial site within the S:t Nicolai complex and contains the remains from at least 44 individuals. Grave goods are present in only 16 % of cases, making, percentage wise, it the least common. Coffin remains, on the other hand, are more in line with the pattern of the longhouse, and are present in 20 % of burials.

When one combines the data from these two aspects, osteological- and burial data, a pattern of differential treatment between impaired- and non-impaired individuals becomes apparent. This is at least the case in the longhouse and the northern cemetery. In these two areas there seems to be a conscious effort to bury impaired individuals in areas that are isolated from the remaining non-impaired population, and/or at areas that are near the edges of the cemetery.

Only two of the eight impaired individuals are buried in a normative fashion, Grave ID 25 and Grave ID 206, see table 1 on page 38. These two individuals have very different funerary context, with Grave ID 25 being buried in the prestigious choir, with both grave-goods and coffin remains, whilst Grave ID 206 is buried in the more crowded northern cemetery, and without any grave-goods or coffin remains. Their burials are both normative nonetheless, given their locations' respective funerary contexts.

Although their funerary execution is very different from one another they still have a lot of other things in common. The fact that it is specifically these two individuals is not a coincidence, since both of them share similar characteristics impairment-wise, being that both their impairments involve head trauma and are both located at easily concealable areas. Both their impairments are also not that severe and would most likely not cause any mental impairment. They would, however, most likely result in the creation of fairly significant and visually apparent scars. However, these scars are located in areas that make them fairly easy to conceal publicly, by either hair or headwear. This is important, since the main considerations regarding impairment in the Middle Ages, according to Danish law codes, were permanent loss-of-function and the visibility of said impairment (Tamm & Vogt, 2016). Both these criteria would not have been met, thus indicating that they would not have been, legally speaking, seen as impaired. This would also most likely be extended to the religious view as well, since they would not struggle to perform any priestly duties or have severe disfigurement that could cause ridicule and scandal (Montford, 2002).

Since disability is a negative / discriminatory attitude towards people with impairment, and since these people seem to not have been subject to any such treatment, both by looking at their funerary treatment and the historical sources, the conclusion is therefore that these people were not disabled. Their scars would have made them physically impaired but they were not disabled.

All six of the non-normative impaired burials involve individuals with fairly significant impairments. One of the six is buried in the longhouse, with the other five being buried in the northern cemetery. Four of the five impaired individuals in the northern cemetery are buried in close proximity to one another in an area that is referred to as the “northern impaired cluster”. The northern impaired cluster contains Grave ID; 115, 132, 153 and 323, and is located at the northwesternmost point and at the furthest distance away from the church within the entire burial complex. Among this group are some of the most severely impaired individuals in the entire material. Their severe impairments could have had the potential to cause negative repercussions upon their financial situations, since they would struggle to perform certain actions inherent to physical labour. Many of them also have very visible impairments, which would make them stand out from the rest of the population. All these facets combined might explain why so many of them are buried in close proximity to each other and in the least prestigious part of the burial complex.

However, their impairment could not have made them completely poor, since if that were the case they would not have been buried at S:t Nicolai in the first place. Burial within the S:t Nicolai complex is, as previously mentioned, a paid privilege, and thus it might look different when compared to that of a more normal parish-cemetery (Burton, 1994 p. 126). This indicates that all the individuals buried here, even the impaired ones, must have had at least some sort of economic security in order to afford the burial dues. If these people, for example, lost their main source of income due to their respective impairments, and as a result were forced to switch to either lower paying occupations or become street-beggars, then in either case they would not have had the necessary funds to afford burial here. These people could, either, still participate in high-paying occupations and thus support their own upkeep, or they came from a wealthy family background that could pay for their upkeep and their subsequent burial dues. It would therefore be valuable to compare the result of this study with that of a more conventional medieval parish-cemetery and see how the results compare.

The notion that these people are from a more social- and economically privileged background is also supported by the nature of the osteological paradox itself (Woods et al., 1992). Only people healthy enough could manage to survive with severe traumatic impairments, and thus potentially being subjected to stigmatic treatment and becoming disabled. The link between wealth and health is clearly visible in modern day society, with lower-income people having on average a shorter lifespan (Woolf et al., 2015 p. 4). This is caused by a multitude of factors like, for example, education levels, access to quality food, access to healthcare, quality housing and less hazardous working conditions (Woolf et al., 2015). These sociological phenomena would also be present during the Middle Ages, albeit with some different dynamics and specifics.

This then creates a bit of a paradox. The people most likely to suffer from traumatic impairments are those people who struggle most to survive it, thus their injuries often result in death, meaning that they do not get to have the possibility to suffer from disability. The people in society that are least likely to suffer from disease and impairment are those that are most well equipped to deal with its consequences, thus making it more likely that they survive their trauma and subsequently become susceptible to discrimination and disability.

Despite coming from more privileged backgrounds, considering that the individuals are buried within a Dominican convent, almost all of the non-normative impaired burials have

individuals that are shorter than the average male, not only when comparing with other males from St: Nicolai, but also with males from the entire medieval population of Helsingborg, see Arcini (2020). The one individual that does not follow this trend is Grave ID 323, aged 67.7 and with an hip impairment, who has a measurement of 188.1 cm, making him by far the tallest individual in the entire material. The general shortness of these individuals might indicate that they are not from the absolute top of society. However, they should still be viewed as coming from an economically privileged background.

This apparent differential treatment towards people with severe impairment seems to be supported by the historical sources. Medieval law viewed impairment as a major negative life event, and thus one could be eligible to receive monetary compensation if one had been the victim of violence (Ekholst, 2021, Skinner, 2017, Tamm & Vogt, 2016). This was done for both purposeful- and accidental injury. Heavy fines were also issued towards people that caused a person to become permanently impaired, which indicates that people took such offenses very seriously (Ekholst, 2021, Tamm & Vogt, 2016). However, this general sympathy towards impaired individuals is challenged by the fact that purposeful mutilation, for example blinding and nose cutting, could be carried out as punishment for committing certain crimes (Skinner, 2017, Tamm & Vogt, 2016). In this context impairment was viewed as something sinful and humiliating. Such mutilating punishments often involved very visible areas around the face, which if done unlawfully was heavily fined. This was made on purpose in order to make them stand out and cause ridicule and humiliation, which can be both seen in the statement made by Hubert of Romans, regarding the baring of disfigured people in the Dominican order, and by the fact that many non-lawfully impaired people sought to acquire certificates proving their innocence (Montford, 2002, Metzler, 2013 p. 30). This might be why the individuals with easy to hide impairments were granted normative burial treatment. Individuals, like Grave ID 132 with a severe facial disfigurement, would, with this background in mind, been likely subjected to various discriminatory behavior.

The religious view, at the time, seems to have been fairly inconsistent. Many churches and convents provided substantial help towards the poor and sick in society, donating money and offering care (Davis, 2014). Impairment could also in certain cases be viewed as something positive, for example regarding various injuries inflicted upon martyred saints (Dickason, 2022 p. 37). Injuries for such individuals would be carried with pride and would still be present in heaven (Metzler, 2006 p. 56). However, the various Christian texts and debates

often view impairment in a negative manner. Parallels are often drawn between sin and impairment, however, the certainness of this idea is challenged somewhat in the New Testament, which is also reflected in the fourth Council of Lateran in 1215 CE (Metzler, 2006 p. 42, Bergqvist, 2013 p. 134-135). Certain higher positions within the priesthood are during different times barred for impaired people which also extends into the Mendicant Orders themselves (Metzler, 2006, Montford, 2002). However, the possibility of requesting dispensation, and the fact that the strictness of such bans varied over time shows that such treatment was not absolute (Metzler, 2006 p. 40). Religious pride of impairments was a phenomena, however, it seems also to have only been reserved for elite religious contexts, like martyred saints, since everyone else would be resurrected in heaven with "healthy" bodies (Metzler, 2006). Impairment for ordinary people would be hidden and even forgotten in heaven, which must have had a profound impact upon their self-identity. Thus, the religious view gives an contradictory view of impairment, although it often results in discriminatory behavior.

However, one must question how this influences the view of the average person and how deep the average understanding of Christianity was at the time. The Bible would not be translated into Danish until 1550 by King Christian III, which is 14 years after the protestant reformation (Ilsøe, 1991 p. 3). Before this the average person would rely upon their local priest to deliver the "correct" message. Another factor is that the debates regarding various passages in the Bible would not be of the concern of the average citizen at the time, but were rather reserved to the religious elite. The average person's view might therefore differ substantially from the view that is being debated in higher religious contexts. A rare glimpse into the average view of sickness at the time, at least in medieval France, indicates that people separated between intrinsic-, seemingly developed without cause, and extrinsic sickness, developed through a particular action or event (Metzler, 2006 p. 72). Since this study focuses on traumatic acquired impairments, it is likely that most ordinary people understood the reason behind a person's particular condition and did not attribute it to mystical things like spells.

With this background in mind, and considering their severe impairments and non-normative funerary treatment, it is likely that they faced discrimination of some kind. These individuals should therefore be considered disabled, since they are seemingly being discriminated against based upon their physical impairments.

However, it is important to acknowledge that there are a multitude of complex factors inherent to the interpretation of culture and funerary data (Bohlin, Croucher & Buckberry, 2022 p. 80). For one, an important concept to keep in mind is the difference of agency between the living, those who construct and perform the burial, and the dead, the person buried in the grave (Härke, 1997 p. 19, Fowler, 2016, Laneri, 2007 p. 2, Williams, 2004). The dead can assert agency over their burial by, during their lifetime, giving specific instructions regarding things like burial location and the deposition of certain items (Williams, 2004 p. 265). However, such requests are at the complete mercy of the living population to execute, thus their actual agency is very limited. The way a person is represented in death is not necessarily the way that person would have wanted to be represented. This notion is not limited to identity, but can be expanded towards treatment as well. The way an individual was treated and generally viewed in life does not necessarily need to be reflected in the way their burial is constructed. A lot of debate has taken place throughout the years regarding how burial patterns should be viewed and what certain differences indicate.

Another important aspect to consider is the fragmentary nature of archaeological materials, which has a major impact upon the subsequent analysis. This has been discussed by Eggers (1951 & 1959), who made the distinction between “living culture", “dead culture” and “retrieved culture" (Härke, 1997 p. 22). “Living culture” is the actual culture that existed in the past. The living culture will eventually with time become “dead culture”. This dead culture can later, through archaeological excavations, be found and thus becomes “retrieved culture”. However, during the process of being “dead culture” many aspects are forgotten and the material itself slowly disintegrates. The retrieved culture is therefore a fragmentary state of the “living culture” which is the culture that archaeology tries to understand (Härke, 1997 p. 22). This can be seen, for instance, in the condition of coffin remains in S:t Nicolai, where certain burials have more and better preserved remains. This is also present when looking at the historical record regarding the treatment of impaired and disabled people. The current record only contains a fraction of all the complexities that actually existed at the time. It is important to keep this in mind when making any wider conclusions about a certain archaeological topic. The conclusions that are drawn here are based upon the currently available evidence.

The main methodology that has been utilized in the study is the newly developed Bioarchaeology of Disability (BoD). The main strength of the BoD lies in the ability to study large materials, that can span a significant geographic area and long time span, in a relatively short period of time. This study, in this context, is fairly limited since it only involves; one cemetery, only individuals with either A or B arm position and focuses only on acquired traumatically induced impairments. This study is made in the context of a M.A-thesis and thus time is one of the main limitations. In an ideal situation would more cemeteries be included, as well as more impairments, in order to gain an even more reliable set of data regarding the view of disability in medieval Helsingborg. The cemetery in of itself is also fairly unique, given S:t Nicolai's Dominican past, and thus the result is even more shrewd in terms of a wider and more general view of disability in the Middle Ages. However, the results in this study can act as a starting point for further BoD inquiries in medieval Scania and Scandinavia at large. The BoD is equipped to combat the issues present here, and thus future studies can confirm or deny the patterns present in this study.

Another strength is the focus on creating a comprehensive picture of disability in the past, by combining data from multiple viewpoints, archaeological- osteological- and historical sources. This allows for a more complete and comprehensive understanding, since so many facets are taken into account when making an overall conclusion.

However, the BoD is not perfect, and there are some aspects that could be incorporated that would add value to the method overall. For example, a small and easy aspect that could easily be added is estimations in stature. This is an aspect that has been incorporated in this study, which shows that 75 % of impaired individuals are shorter than their average counterparts. Comparing the estimated height between impaired- and non impaired individuals gives an indication if, during the growing years, they had access to a similar amount of nutrition. One of the most influential aspects regarding height, after genetics, is access to nutrition during childhood (Perkins et al., 2016). If an individual received their impairment after growth has stopped then their height has already been determined and would thus not be negatively influenced. However, height data for such individuals is still interesting, since it gives clues about their upbringing and social status. Estimation in stature could easily be added to a study if such data already exists in the relevant material of analysis. If this is not the case, and if time can not be spared to conduct such an analysis by oneself, then this is an easily skipped step, since it is not foundational to the whole analysis.

The utilization of more sensitive tools for assessing skeletal injuries and other potential complications is another aspect that can be added. For example utilizing tools that add macroscopic-, radiographic- and biomechanical data. This was recently done in a study by Dittmar et al. (2023) published in International Journal of Paleopathology, titled "*Caring for the injured: Exploring the immediate and long-term consequences of injury in medieval Cambridge, England*". A more comprehensive and detailed understanding of the impairing qualities of certain particular injuries gives more creedence to any conclusions that are made upon such individuals.

Another aspect that could be incorporated, albeit an expensive one, is data from various isotopic analyses, for example; δ13C, δ15N & strontium (Larsen, 2015 p. 302, 320 & 339). Comparing the values from the various isotopic analyses between impaired- and non impaired individuals would add another level of depth to the analysis regarding migration and diet. Strontium data could, for example, show if there is any difference in burial treatment of local- versus non-local individuals and if that pattern is also present within the impaired population. Data from δ13C & δ15N would give a more detailed view regarding diet, which is something that is missing in the current formation of BoD. Comparison of diet could be done on several different groupings, for example between; impaired and non-impaired individuals, exclusive and non-exclusive individuals and normative impaired- and non-normative impaired burials. This is, however, a fairly expensive endeavor to undertake and would in most cases not be a viable option. One could start by taking samples from a smaller and random sample to get at least some data.

Further research into the topic of impairment and disability in the past should focus on expanding the scope of inquiry. Using larger materials, more cemeteries and considering all forms of impairment, including congenital, disease and age related. This will result in a more in-depth understanding of impairment and disability. More studies focusing on medieval Scania, and even Scandinavia at large, needs to be done to confirm if the pattern observed here is universally applicable. It would also be valuable to continue the research with Mendicant Order cemeteries specifically, in order to see if the pattern observed here in S:t Nicolai, Helsingborg, is also the same in other areas.

This subject has a lot of potential that is just waiting to be discovered.

9. Conclusions:

By utilizing the methodological approach, known as the BoD, the study concludes that marginal burial was granted for severely impaired individuals in S:t Nicolai, Helsingborg. All individuals with mechanically limiting, or visually apparent impairments were buried in areas located a long distance away from the church, and/or in isolated areas. The individuals with the least severe impairments, i.e impairments that are easily concealable and that do not cause any mechanical limitations, were all granted normative treatment. This result is in line with what the contemporary religious and legal sources state regarding impairment and disability.

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11. Appendix:

Grave ID 405 & 520 has an unknown location and are thus not illustrated in any of the maps.

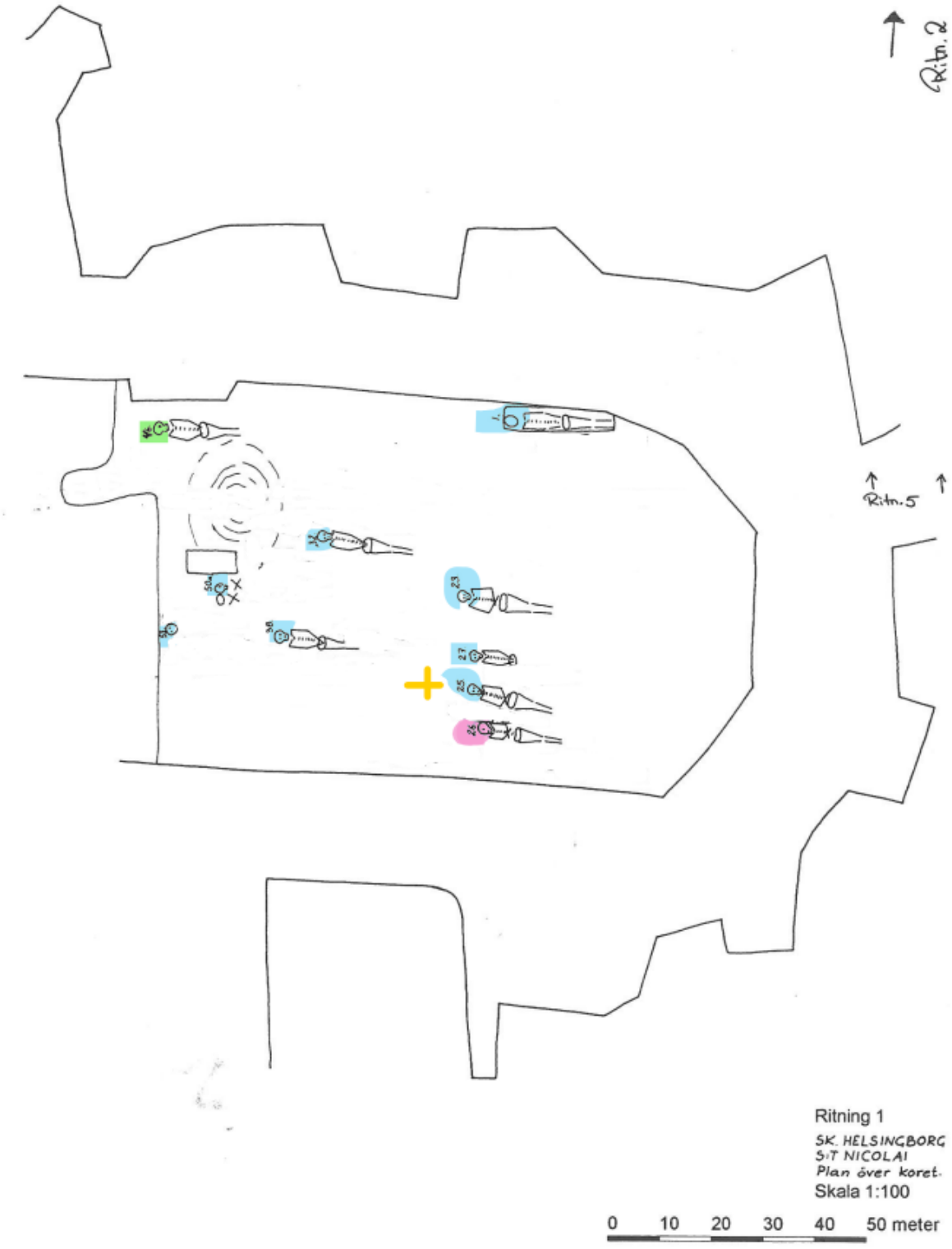

Figure 17: Burials within the Choir, only individuals with arm-position A or B illustrated.

Blue = Male. Pink = Female. Green = Child. Yellow Cross = Physically impaired.

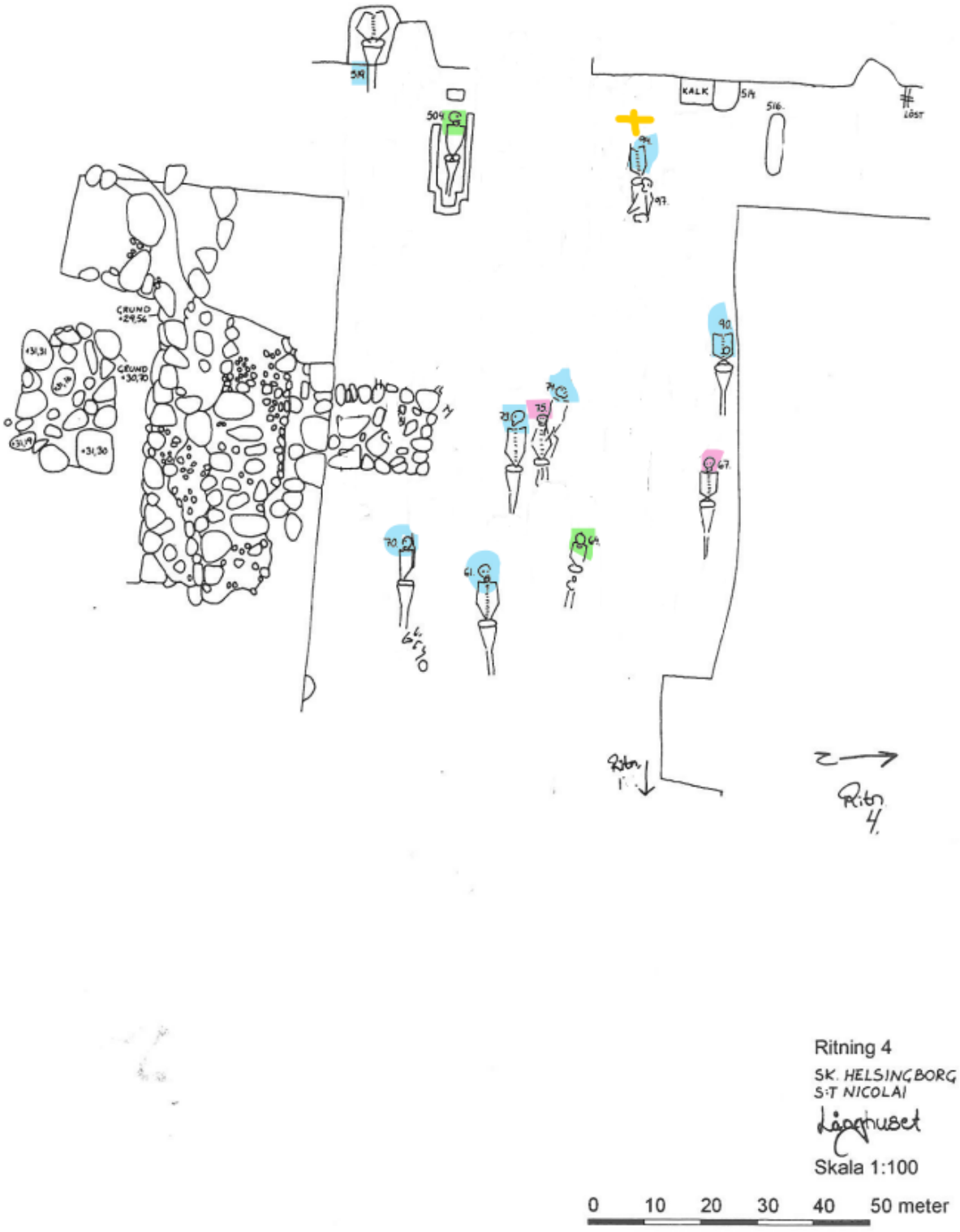

Figure 18: Burials within the Longhouse, only(*) individuals with arm-position A-B illustrated.

**Note Grave ID 97 (with armpostion D) just east of the impaired Grave ID 94.*

It is possible that it is there that the so-called extra cranium belongs.

Blue = Male. Pink = Female. Green = Child. Yellow Cross = Physically impaired.

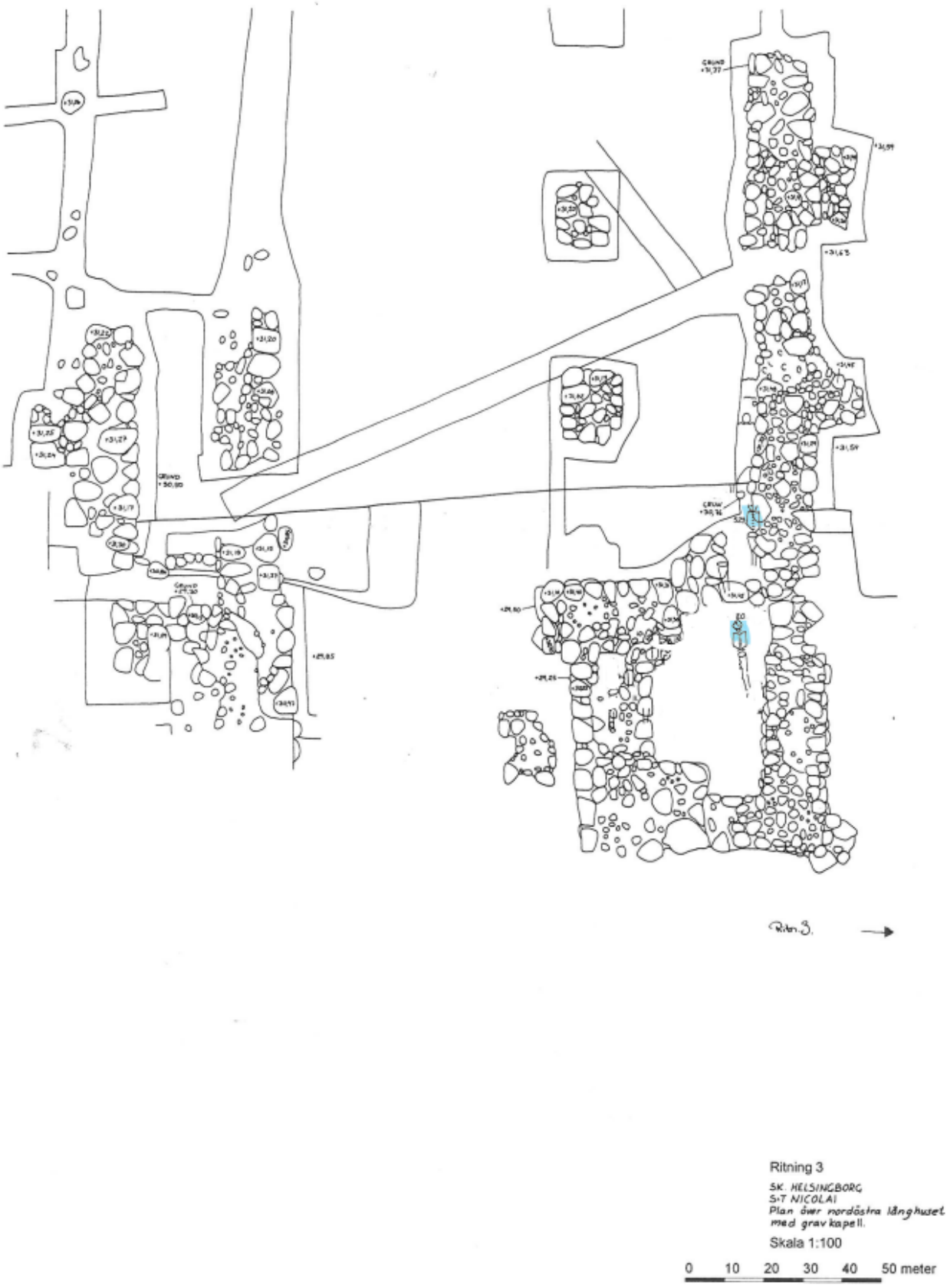

Figure 19: Burials within the northeastern corner of the longhouse, identified as a chapel, with arm-positioning A-B illustrated.

Blue = Male. Pink = Female. Green = Child. Yellow Cross = Physically impaired.

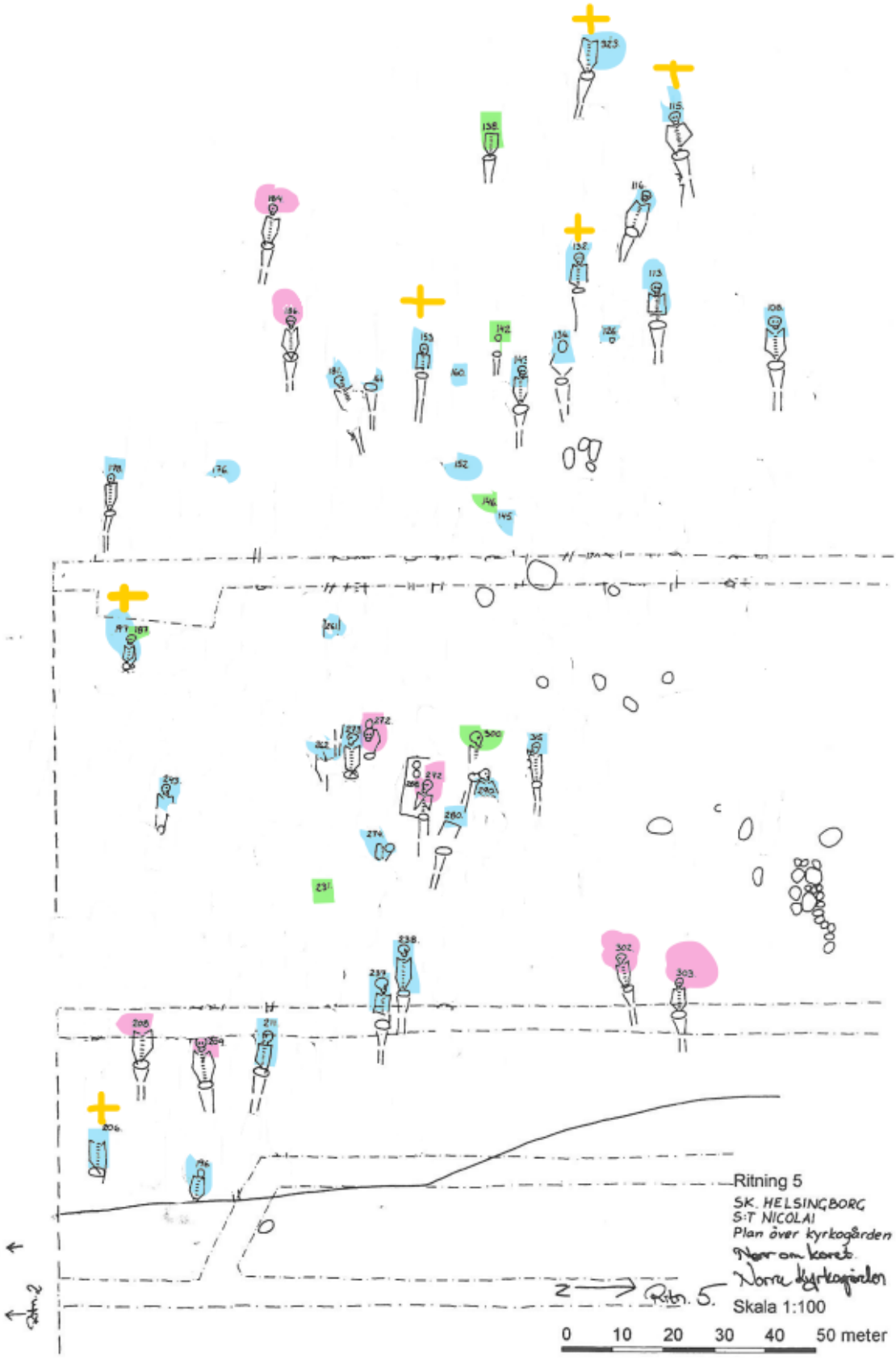

Figure 20: Burials within the northern cemetery with arm position A-B illustrated. Blue = Male. Pink = Female. Green = Child. Yellow Cross = Physically impaired. Grave ID: 127, 150, 236, 299, 301 & 311 are located here but are not illustrated.