# Chapter 7: Discussion

## 7.1 Social Effects of Castration

The history and sociology of castration have had profound effects on its continued use through time, influencing where, when, how, and on whom castration is performed. By understanding where and when human castration began, how it was used and possibly transmitted from society to society, its relationship to and with animal castration, and how castrates were perceived and treated within their societies, we can understand the importance of castration to world history and begin to trace the archaeology of castration.

### 7.1.1 Historical and Modern Perceptions of Castration and Castrates

The origins of castration are unclear. It is likely that castration in humans derived from the castration of domesticated animal herds, possibly in the context of slavery and social control. As such, it involved the highly visible demonstration of power and control over individuals within ancient populations. The location and motivation for the step from what was probably small pockets of castrated individuals into the highly stratified and organised hierarchy of religious and court castrates is not currently understood, but likely first took place in Western Asia in either Mesopotamia or what is now Anatolia around 4000 B.C. Multiple reasons for the continuation of castration for nearly six millennia probably existed and likely had to do with the common use of castrates in highly hierarchical institutions such as imperial court systems and religions. The practically unfettered access to centres of power given to castrates by their roles within these institutions, especially in imperial courts, led to the isolation of castrates and jealousy from those individuals, often male governmental bureaucrats or nobility, who were excluded from closer relationships with the ruler.

That human castration would arise hand-in-hand with the secondary products revolution is not surprising, as increasing social complexity, imperialism, and highly stratified societies, especially urban civilizations, also arose at that time. As castrates increasingly became regarded as foreign and “other”, it became possible to ascribe to them practices, habits, and character traits which an individual might not possess, but which castrates as a whole might. Castrates in turn used these perceptions to perform those roles and tasks that would bring them the most benefit, forming a symbiotic relationship between elites and castrates. As empires and the desire for castrates grew, it

became increasingly necessary to invest in and utilize large trade networks to bring in castrated individuals from without the culture's borders so that those serving as castrates, especially slaves, were not "one of us".

There were multiple motivations for castration: force,[519] economic difficulties (wherein you or your family did not have the resources to feed everyone or it was desirable to keep what land and resources were available in the main branch of the family, so a (often younger) son was castrated in the hope that he would gain a career and potentially wealth for the family),[520] coercion on the part of officials (either of the church or the government),[521] and choice.[522] It is important to recognize that some castrates had the power to choose their fate; to ignore this risks denying them their agency and may distort the historical record. While societal or familial pressure may have strongly influenced the castration of large numbers of individuals, it must be remembered that many individuals actively pursued castration, in part because it helps us to better understand castrates as a whole and in part because it reminds us that not all castrates were victims of brutal, faceless regimes. It could be argued that their place in a society that drove them to castration made them victims, but this only serves to cloud the issue with sentiment, decreasing rational thought and preventing the study of an important topic. There are records from a number of cultures that document willingness on the part of both men and young boys to be castrated, and that some individuals, even and especially boys, actively pursued castration, going so far as to petition church leaders for funds to have the surgery performed.[523] Many are tempted to dismiss the validity of the agency of the boys, claiming that they were too young to understand what would happen to them, but this often reflects modern attitudes about children and may not be the most accurate representation of children in the past. Declaring these children incapable of understanding what would happen to them when they were likely surrounded by the effects of castration on a daily basis both denies them their agency and creates a particularly condescending, futurist atmosphere for the study of any children in the past, not just those who, either willingly or not, were castrated.

The fact that medieval to early modern Western Europe did not have much contact with castrates employed in a system of imperial eunuchism and that the castrati

[519] (Scholz, 2001; Taylor, 2002; Tougher, 2008)
[520] (Rosselli, 1988; Tsai, 1996; Wilson and Roehrborn, 1999)
[521] (Rosselli, 1988)
[522] (Dale, 2010; Nanda, 1999; Pittard, 1934; Rosselli, 1988; Wilson and Roehrborn, 1999)
[523] (Jay, 1993; Koch, 1921; Rosselli, 1988)

singers had largely disappeared from public view by the end of the 19th and beginning of the 20th centuries A.D. has influenced the way that castrates are perceived in the English-speaking world. Despite some familiarity with castrated singers, the castrates of the Ottoman, Islamic, and Chinese worlds were seen as exotic, curious individuals. This lack of familiarity with castrates led to the borrowing of ancient authors' opinions, the uncritical acceptance of the attitudes of castrates' contemporaries, and a general attitude of pity and condescension when referring to castrates. Even today, discomfort with the topic leads to jokes and sly references to castrates, and attitudes to castrates can be or are also typified by orientalism, essentialism, racism, classism, and exoticism.

The Western calls for the cessation of castration, especially in children, which began as early as the beginning of the 19th century and peaked in the early 20th century,[524] were at least in part motivated by pity and a feeling of superiority over those regions that practised castration. This sentiment evolved at least in part from the growing perception of the child as not just another body – part of the wider remit of the family, but as an individual who could and should be protected against all that the world would do to them.[525] This particular perception of children was especially encapsulated in the Victorian ideas of the child,[526] which only pertained to noble and rich children at first, but which has subsequently trickled down through the various "classes" into a concept that children must be protected at all costs, particularly in regard to anything to do with their own bodies and anything that might lead to or hint of sex. While this is not necessarily a bad attitude and has provided far better conditions for children over the centuries, it clouds our perception of children in the past and their capability to make informed, rational decisions as individuals.

Previous research into the history of castration and specific groups of castrates has highlighted trends that can be discussed using modern social theories, such as sex, gender, sexuality, identity, and liminality. Most of the social aspects that affected castration were embedded in castrates' physical states. For castrates, the social aspects of castration cultures affected the physical shaping of their bodies, which in turn affected the social culture in which castrates operated, creating a feedback loop that encouraged the continued use of castrates. The ambiguous sex of castrate bodies created a shifting, liminal gender for castrates, which allowed their use in social roles and occupations that

[524] (Andrews, 1898; Lortet, 1896)
[525] (Pollock, 1983; Zelizer, 1985)
[526] (Zelizer, 1985)

would not have been possible for other individuals. These differing sex and gender roles within societies could also create alternative sexual roles for castrates in which they became the highly desired sexual companions for both men and women. Whether these sexual roles actually reflected what today would be considered castrates' sexuality is unclear, especially as modern concepts such as homo- or heterosexuality likely did not exist in the past.[527]

It is possible that the Western idea of castrates as effeminate and womanly was drawn directly from one of their uses: namely, their employment as guards and entertainers for the women of a household, meaning they spent the majority of their time with women, a marker of effeminacy in several cultures from the antique period through the Renaissance.[528] In Rome, both *galli* and castrate slaves kept as sexual companions would or could dress or be dressed in women's clothes,[529] embodying at least part of the concept of *cinaedus*. The ambiguous body of the castrati, dressed as either male or female (and sometimes both) in operatic roles, incited desire in both males and females in Baroque Europe.[530] This aspect of castration can still be seen in *hijra* today, who as sacred feminine men, dress in women's clothing and dance and sing.[531] This effeminacy was often criticised and used to marginalise castrates within wider societies.

What is often left out of modern discourse about castration and castrates are discussions of castrate personal agency, individuality, and reflexive social identity. Castrates are often referred to as a large, monolithic group, either within one culture or across cultures. This is likely due at least in part to the historical context of castration studies, which are all externally based, with few discussions of castrate life written by castrates. Whether castrates considered each other as compatriots is unclear, though there are hints that some of them did form close bonds with each other.[532] What has been suggested by recent research is that castrates were (unsurprisingly) very aware of others' perceptions of them and that they were willing to and did use these perceptions to their personal benefit.[533] Castrates rarely seem to have been constrained by external perceptions, except when they were required to pay them lip service.

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[527] (Halperin, 2000; Williams, 2010; Winkler, 1990)
[528] (Halperin, 2000)
[529] (Tougher, 2008)
[530] (Freitas, 2003)
[531] (Nanda, 1999, 1994; Reddy, 2005)
[532] (Heartz, 1984; Savage, 2005)
[533] (Kutcher, 2010)

One point which must be made eminently clear is that an overarching "castrate identity" probably did not exist. As has been shown, castrate identity and personality varied drastically within one society over time and among individuals. Taking this to a broader scale, it immediately becomes clear that, while similar reasons across time and space could drive individuals to undergo or commit castration and similar institutions could exist to exploit castrate labour, the ultimate reasons for castration and the experience of being a castrate could be and were as individual as the castrates themselves.

Further work on castrates' sense of personal identity, group identity, and use of external perceptions may help to elucidate internal power struggles within imperial and religious hierarchies and the ways in which specific, small numbers of castrates managed to accrue large personal fortunes. As this personal acquisition of power and wealth was one of the most contentious aspects of castrates for the nobility and bureaucratic elites of empires, and as a large number of dynasties were either controlled or ended by castrate power grabs, a better understanding of castrate self-identity, motivation, and networking would provide new, interesting, and important discussions on world history. In addition, a better understanding of castrate identity and social networking would help to explain the persistence of certain "castrate myths", such as their extreme loyalty to a singular individual, often the ruler, in the face of obvious contradictions to these myths, such as the deposition of one imperial dynasty for another.[534]

### 7.1.2 Treatment in Life

The elements of daily life such as diet, nutrition, health, and occupation can impact the skeleton, causing it to adapt to changes in the environment. These changes, when detected within the skeleton, give clues to individuals' lives. The "eunuchoidal" suite of anatomical changes included both soft tissue and skeletal changes which made castrates physically distinct members of their society. This outward appearance put castrate bodies on display all the time. It influenced attitudes to their gender and social roles, which then affected their social status and treatment. From the moment castrates underwent surgery to the moment they died, their bodies became living forums for public opinion, debate, and, often, disgust. While we cannot currently tell how individuals within the collective group of castrates may have been treated in their daily lives, we can

[534] (Jay, 1993; Kia, 2010; Ringrose, 2003)

glean some clues as to the treatment of castrates within specific regions from the literature as well as the archaeological evidence for daily life in the region.

These attitudes are most obvious in the Western historical texts that discuss castrates, beginning with the Greeks and carrying forward into the early modern period. Ancient sources are full of invective, describing castrates as weak, lazy, cunning, and selfish monsters.[535] Terence devoted a portion of a play to the ridicule and dismissal of castrates,[536] and Charles d'Ancillon wrote a pamphlet describing their vices when castrati were at the height of their popularity.[537] While the Chinese were not as scornful of castrates' physical state, they were still harsh about their moral and social state, criticizing them as greedy and grasping for power and favours.[538]

Whatever the truth about castrates' nature, they often served in palaces or government positions that put them in direct contact with those in power. As a high death toll often accompanied the creation of castrate slaves, they became luxury items and were not usually subjected to heavy labour, instead being utilized as personal attendants, servants, teachers, and household managers.[539] The high price paid for castrates, either slave or free, associated them with the upper classes, an association which often led the majority of the populace to despise them not only as mutilated beings, but as symbols of an often hated aristocracy.[540] Information about the lives of castrati raised in the conservatories of early modern Italy indicate that the life of a castrato, while full of hard work, was considerably more "elite" than that even of other music students,[541] and their fame and influence over early modern rulers often led to resentment and personal attacks in print.[542] This could lead to very precarious positions for castrates, as they could gain enormous rewards but also risked a ruler's censure, with little to no wider social network on which to rely should they be removed from their positions.

In general, the picture painted for castrates' lives is one of social privilege for a select group close to the ruler or those in power, or those who managed to gain power and prestige of their own, and a somewhat more precarious situation for all those who either could not or did not gain such positions and power. Combined with the social

[535] (Scholz, 2001)
[536] (Terence, 2000)
[537] (D'Ancillon, 1718)
[538] (Mitamura, 1970; Tsai, 1996)
[539] (Scholz, 2001)
[540] (Krimmer, 2005; Olson, 2004)
[541] (Peschel and Peschel, 1986)
[542] For example, (D'Ancillon, 1718)

scorn and isolation associated with their state, lower-ranking castrates may have had quite hard, harsh lives. The question now is whether the process of castration allowed these castrates to live an easier, or at least more stable, life than had they remained uncastrated.

### 7.1.3 Treatment in Death: Burial Practices for Castrates

The discourse over the gender, and therefore social, role of castrates as it sprang from attitudes towards castrate bodies does not appear to have extended beyond death. Little to no information about castrate burial is available in the historical record. While the sources are full of information about castrates' social roles and how their societies viewed them, there are rarely references to the daily life of castrates, or what occurred after they died.

The lack of information about burial ritual may indicate that castrates were accorded the same burial rituals as other members of society, but the description of two separate burial rituals for castrates - *galli*[543] and Chinese eunuchs[544] - may indicate that castrates did receive different burial treatment from the rest of society, and that this was either never recorded or has been lost. The burial rites, or lack thereof, may be based on the perception of castrates in their society as well as their social roles and responsibilities. In China, where castrates were seen to be mainly masculine, the burial rite emphasized the lack of filial piety shown by a castrate in not providing blood heirs to continue the worship of the family ancestors.[545] The *galli* funeral rite seemed to be concerned with a quick disposal of the body and the restriction of those involved in the ritual until they were again deemed pure enough to enter the temple of the goddess.[546] Some further evidence of the *galli* funerary ritual may be found in the burial of the 'Catterick eunuch', an inhumation discovered during the excavations at Catterick, Yorkshire, England. This individual, described initially as a young man, was discovered wearing a matching jet necklace and bracelet, items considered magical, and an expanding anklet, causing the investigators to declare him a possible *gallus* of Cybele.[547] The press quickly ran the story, not always in a favourable way. It has since become difficult to access most of the information about the skeleton, as well as the skeleton itself, making it difficult to

[543] (Lucian, 1913 (DDS 52))
[544] (Jay, 1993)
[545] (Jay, 1993)
[546] (Lucian, 1913 (DDS 52))
[547] (Derbyshire, 2002; Tougher, 2008; Wilson, 2002a, 2002b)

determine whether the individual was in fact a castrate or a *gallus*. It is therefore difficult to determine whether the grave and grave goods are at all representative of a *gallus*' grave. There is evidence that castrati were buried according to the same funerary ritual as other Christians in the early modern period, as the remains of Farinelli were exhumed from a number of normal graves, the last of which was in a cemetery in Bologna.[548] It may be that the difference in castrate burial stems less from the manner of burial and more from the rituals performed at the burial.

If the difference in castrate burial were in the ritual rather than the physical location or layout of the burial, their burials would be virtually indistinguishable from those of the rest of the population, masking castrates' presence in a cemetery population. Duyar and Pelin[549] have demonstrated that using the single regression formula created by Trotter and Gleser[550] to estimate stature will underestimate the stature of tall individuals, which would help to mask the signature of castrates who have grown taller than the population in which they have been buried. In addition, the studies of living castrates highlighted the fact that not all castrates grow excessively taller than the population in which they live.[551] Many of these studies noted that it was instead the proportions of the extremities to the torso that indicated a prepubertal castrate. As there is currently no method of measuring entire skeletal proportions, it is possible that castrate skeletons have gone undetected in cemetery populations, being recorded merely as tall, possibly gracile, indeterminate individuals.

In the early modern period, even though anatomical schools were beginning to practice cadaver dissection and pathology collections were being formed, collectors seem to have ignored castrate bodies. It is curious that few to no medical studies were performed on castrates during a period when medicine and science were taking their first steps towards their modern state, when sea voyages were forging better connections with kingdoms such as the Chinese Empire, which heavily employed eunuchs, and when castrates were so familiar both from the castrati singers and from the Ottoman Empire. The lack of castrate bodies in anatomical collections may stem from a general lack of interest in castrates; a deliberate decision to exclude castrate bodies; the perception that castrate bodies were man-made monsters, while collectors were interested in natural

[548] (Belcastro et al., 2011; Westphal, 2006)
[549] (Duyar and Pelin, 2003)
[550] (Trotter and Gleser, 1958, 1952)
[551] (Koch, 1921; Pittard, 1934; Tandler and Grosz, 1910b; Wagenseil, 1933a, 1927)

variations in human development; or a lack of castrate bodies to collect. It is also possible that castrates were so prevalent when the collections were being formed that it was not thought necessary to include the skeletons of castrates, as they were in ready supply. Whatever the reason for the lack of skeletons, it makes it difficult to examine the effects of castration on the development of the skeleton from known castrates. Therefore, castrate skeletons will have to be recovered from archaeological contexts.

It is possible that castrate skeletons exist in Egypt. This would likely be due to the influence of the Ptolemaic dynasty, a Greek dynasty founded in the Egyptian part of what had been Alexander the Great's empire and which was supposed to have been fond of them, and to the strong Persian influence before and during Alexander's rule, rather than a large presence of castrates in dynastic Egypt.[552] It would be difficult to identify castrate skeletons in Egypt, in part because of the trouble with isolating a term that refers specifically to castrates in the Egyptian language. In addition, while in many ancient civilizations, masculinity was partially displayed through the growth of a beard, Egyptian practice and preference was usually for clean-shaven men. This means that, while in Assyrian, Persian, Greek, some Roman, and later Byzantine images, arguments can be put forward for the presence of castrates due to their lack of beards amongst bearded men, in Egypt it is impossible to say whether an individual was a castrate based on a lack of a beard in portraiture. Another problem is the ancient Egyptian belief that the body must be complete at burial. While funerary and cartonnage portraits may have presented the deceased as they appeared in life, it may have been inappropriate or even dangerous to put either an image or description of the deceased as a castrate on the sarcophagus or mummy case for fear that the deceased would be a castrate in the afterlife as well. The use of traditional Egyptian funerary beliefs continued into the Greco-Roman period in Egypt, likely influencing what information would have been placed on the coffins of Ptolemaic or Greco-Roman Egyptian castrates.

In a similar belief, the preserved remains of the genitals of Chinese eunuchs were buried with them so that they could become whole again after death.[553] This, and the evidence for cemeteries specifically for castrates,[554] may make it easier to recover the skeletons of castrates in China and Korea. An additional aid in the search for castrate graves in East Asia is that several wealthy eunuchs erected tombs and tombstones for

[552] (Kadish, 1969; Tougher, 2008)
[553] (Stent, 1876)
[554] (Jay, 1993)

themselves, which often became focal points for other eunuch graves and indicate the owners' status.[555] In areas that experienced Islamic or Ottoman control, it may be possible to determine castrate burials through items in the grave with castrates. As most Islamic castrates were from Africa, they had usually undergone the complete method of castration, which involved the removal of the penis. Once the penis has been removed, it is necessary to introduce some item into the opening of the urethra to prevent its closure.[556] In China, pewter, tin or wooden plugs were often used,[557] and in the Ottoman territories, it appears to have been a long plug that was tied around the waist.[558] If the material for plugs was consistent across large numbers of castrates, resilient (i.e. some form of metal), and was not removed from the body at burial, it is possible that castrate remains might be identified from the remains of plugs in the pelvic area of skeletons. Additionally, bladder inflammation was a common complaint of complete castrates,[559] so changes to pelvic bones indicating chronic infections or grave goods that might have been used to treat chronic infections might suggest castrate status.

It is possible that castrates formed burial clubs or otherwise made accommodations for their burial. This is demonstrated by Farinelli's original interment in the Church of the Capuchins monastery in Bologna,[560] a prestigious burial location for the time and which was undoubtedly paid for by the money he had made during his career. In another case, a eunuch in China drew up a contract with a monastery to guarantee that his donations would ensure the caretaking of his tomb and perpetual sacrifices in his name.[561] Other Chinese eunuchs also managed to ensure their burial, as evidenced by a number of tombstones bearing inscriptions dedicated to eunuchs.[562] A few tombstones of *galli* have been discovered across Europe.[563]

Is it possible to trace castration archaeologically through the presence or absence of the genitalia? The genitals removed from Chinese castrates were preserved in porcelain jars so that they could be used as proof of castration at promotions. The genitals of *hijras* were buried under a tree after castration. There is some evidence that

[555] (Eng et al., 2010; Jay, 1993)
[556] (Wilson and Roehrborn, 1999)
[557] (Wagenseil, 1933a)
[558] (Wilson and Roehrborn, 1999)
[559] (Wagenseil, 1933a)
[560] (Belcastro et al., 2011)
[561] (Goossaert, 2007)
[562] (Eng et al., 2010; Jay, 1993)
[563] (Beard, 2012)

the genitals removed from boys in early modern Spain were fed to dogs or otherwise quietly and discreetly disposed.[564] As the genitalia are soft tissue, they are less likely to be preserved archaeologically unless they are purposely preserved, like those of the Chinese castrates. It is possible that one could detect castrate mummies by an absence of their genitalia. However, as was seen in Nekht-Ankh,[565] correctly identifying the presence and conformation of mummified genitalia can be extremely difficult.

There is currently not enough known about burial practices for castrates, which makes the recovery of known castrate skeletons difficult. Recovery would currently be easiest in areas where large castrate cemeteries are known to have existed, such as China or Korea. A large eunuch cemetery on the outskirts of Seoul, Republic of Korea, is under the protection of the government as cultural heritage, and plans are being made for its eventual excavation,[566] but this may not occur for several more years. Knowledge of the burial location of other castrates, such as the castrati Rauzzini in Bath, England[567] or Islamic eunuch cemeteries in Cordoba, Spain or Sicily, Italy, would assist in gaining permission to excavate and examine their remains. In the meantime, work on previously published and recently acquired anthropometric and osteometric data can begin to highlight the changes to the skeleton caused by prepubertal castration, improving the ability to detect castrates within mixed skeletal populations.

### 7.2 Physical Effects of Castration

There are very large numbers of castrates recorded historically, but they are not identified archaeologically. There are several possible reasons for this, including the possibility that excavators and osteoarchaeologists do not know how to recognize the changes to the skeleton caused by castration, the possibility that the large numbers in texts are incorrect, the possibility that the skeletons simply do not survive the burial environment, and the possibility that the skeletons survive the burial environment but are in too poor a condition (i.e., incomplete, heavily weathered, fragmented, or cremated) to identify as castrates. This last possibility seems unlikely, as children's bones and the bones of the elderly, both of which are often delicate, are successfully retrieved from archaeological excavations. This leaves the possibility that the numbers discussed in

[564] (Behrend-Martinez, 2005)
[565] (Cameron, 1910)
[566] (Shin, personal communication)
[567] (Barbier, 1998; Sands, 1953)

historical texts has been exaggerated, which may have been the case, but is not possible to ascertain until the last possibility, that excavators and osteoarchaeologists do not know how to identify castrate or intersex skeletons, has been fully addressed. Intersex individuals only make up a small percentage of the population, but they are part of the normal human phenotype, and many would show skeletal changes similar to those of physically castrated individuals. There is only a small amount of reliable osteological data for castrate skeletons on which to base any descriptions of the changes to the skeleton. Only two examinations of complete castrate skeletal remains were published in the early 20th century,[568] and only two studies have been published in the last five years, combined with the two skeletons in this thesis for a total of five castrate skeletons and one possible castrate skeleton.[569] As there is a dearth of castrate skeletal remains, information about the changes to the skeleton must be gathered from studies of living individuals and studies of other mammalian species, which may highlight common changes to the castrate skeleton, allowing those mammals to be used as proxies for humans.

For most of the changes to the skeleton to be expressed, prepubertal castration must occur. Many of these changes can also occur in postpubertal castrates and nearly if not all of the same changes are seen in midpubertal castrates as are seen in prepubertal castrates. Midpubertal and postpubertal castrates can still be distinguished metrically and, to nearly the same extent, morphologically, from the wider human population, as can prepubertal castrates. More castration effects manifested in postpubertal castrates than would be expected from their age of castration. This could result from a later onset of puberty in the past, poor diet leading to delayed puberty, or a higher incidence of hormonal insensitivity or other congenital endocrinological conditions in the past and needs further study. Historical documents hint at higher ages of puberty even in the early 20th century,[570] indicating that the pubertal ages used here, conservative as they are considering modern pubertal ages, may be too young to properly assess puberty in the past. Wagenseil stated that the widely accepted ages for long bone fusion when he was taking his measurements in the A.D. 1920-30s was twenty-two for the arm bones and twenty-five for the leg bones, in general two to five years after most of the bones of the

[568] (Lortet, 1896; Tandler and Grosz, 1909)
[569] (Belcastro et al., 2011; Eng et al., 2010)
[570] (Parent et al., 2003)

arms and legs would be expected to be fully fused today.[571] This difference in fusion times may be due to an earlier age of onset of puberty in modern populations or nutritional deficits in early 20th century individuals delaying puberty. Poor diet may also have contributed greatly to a delayed onset of puberty, allowing epiphyses to remain open long enough to be affected by castration even if it occurred late in the second decade or well into the third decade. This could be assessed by stable isotope analysis of the dentine and bone of castrates, as well as indicating whether the perception that castration improved quality of life due to steady employment is true. Knowledge of the prevalence of endocrinological and congenital disorders in the past is sparse at best and is mostly predicated upon rates of incidence in contemporary populations. Better understanding of the skeletal effects of these disorders could help the identification of intersex individuals archaeologically, improving our knowledge of the history of these conditions.

The anthropometric studies note that not all prepubertal (or "early") castrates would grow excessively tall.[572] This is not surprising, as an individual's potential for growth would only be augmented by the growth plates' lack of fusion (caused by a lack of oestrogen and testosterone), and not an increase in growth hormone or thyroid hormones. That the lack of hormones caused by prepubertal castration delays bone fusion and exaggerates long bone growth has been clearly demonstrated in multiple mammalian species. Wagenseil also stated that as the legs cease growth at a later time than the arms, they are more likely to show elongation as an effect of castration.[573]

There is a discrepancy between bone fusion and tooth eruption and wear (though degree of wear can be complicated by particularly gritty diets), as demonstrated in the cases of Farinelli and M2. The delay in bone fusion makes castrates appear to be much younger than they are, but as has been shown, the teeth erupt at the normal time in human castrates. Therefore, the eruption (and wear) of the third molar but unfused epiphyses would show this discrepancy, indicating that this is a valid and worthwhile method of detecting castrate skeletons. The discrepancy between fusion and tooth wear should immediately make castrates stand out in skeletal populations, but it is also possible that in areas known to have heavy grit in the diet, such as Egypt, the discrepancy between tooth wear and fusion might be taken as an indicator of particularly

[571] (Wagenseil, 1933a, 1927)
[572] (Koch, 1921; Pittard, 1934; Tandler and Grosz, 1910b; Wagenseil, 1933a, 1927)
[573] (Wagenseil, 1933a)

gritty diet rather than status as a castrate. In both of the above cases, the osteologists had foreknowledge that they were dealing with castrates, and therefore knew to look for unfused bones and erupted teeth, but as long as an osteologist is aware of the effects of castration and that the skeletons they are examining come from a region and time where castrates may have existed, they could potentially find castrates within skeletal populations.

Another indicator of castrate status is early-onset or severe osteopenia and osteoporosis, seen in the Lyon castrate and Nekht-Ankh, as well as a number of the anthropometrically and osteometrically examined castrates. A majority of the Chinese castrates displayed kyphosis,[574] which can be a side effect of osteoporosis. None of Wagenseil's Turkish castrates showed signs of osteoporosis, but they were younger when measured and possibly had higher bone mineral densities.[575] The discovery that exercised castrated rats have a greater bone mineral density than sedentary castrated rats, and that both groups of castrates had lower bone mineral density than both exercised and sedentary intact rats,[576] may indicate that castrates who exercised more were less likely to develop osteopenia or osteoporosis.

In addition, the lack of gonadal hormones may have led to the development of *Hyperostosis Frontalis Interna* (HFI) in castrates. Farinelli had a severe case of HFI, and as he had been castrated around six years of age and died at seventy-seven, he had over seventy years to develop such an extreme case. However, the Lyon castrate, who was castrated at an unknown (but probably quite young) age and died at twenty-five, had already developed at least first stage and possibly second stage HFI. This indicates that the lack of androgens caused by prepubertal castration may lead to an advanced state of the condition at an early age, making HFI a good additional indicator of castrate status.

Marshall and Hammond's[577] investigation into horn growth in sheep showed that once sexually dimorphic skeletal traits were acquired, castration would not make them disappear, but that sexual dimorphism would not continue to develop once the strongest source of testosterone was removed. Thus, it should be possible to identify at what age an individual was castrated by the degree of sexual dimorphism they display coupled with the state of epiphyseal fusion. For postpubertal castrates, sexual dimorphism should

[574] (Wagenseil, 1933a)
[575] (Wagenseil, 1927)
[576] (Horcajada et al., 1997)
[577] (Marshall and Hammond, 1914)

be similar to the rest of the male population, with early-onset degenerative changes marking them out most clearly.

If the skulls of the Lyon castrate and Nekht-Ankh are compared to the skulls of the Tandler and Grosz castrate and the two Ming Dynasty eunuchs examined by Eng, it is possible to come to some conclusions about the general morphology of castrate skulls. "Deeply saddled" noses were seen in both living castrates and the skeletons of castrates (Sections 5.1.2.1 and 5.1.2.2, studies by Tandler and Grosz).[578] It is also possible to see very concave nasal slopes in several of the castrate skulls examined in **Figure 6.14**. The concavity of the nasal roots may be a result of slow fusion of the nasal bones to the frontal bones. Whether this is an effect of castration is unclear, as it was not seen in all castrates. It is possible that delays in facial growth and epiphyseal fusion led to a more horizontal aspect of the nasal bones in some castrates, leading to a deep, concave nasal root. In addition, the mandible appears to form a much deeper body and thicker ramus, with shallow mandibular notches, and the dentition appears to become slightly prognathic, potentially because the maxillae were still fusing at the time of castration. Castrate faces also tend to be tall and narrow, but with childlike aspects, due to a smaller craniofacial area. Cranial shape may also be more ovoid and doliocephalic. Overall, castrate skulls show an indeterminate sexual dimorphism, probably caused by the lack of testosterone. This is borne out by Dahinten and Pucciarelli's[579] examination of malnourished and castrated rats, in which cranial sexual dimorphism was shown to be increased by testosterone and decreased by estradiol in male rats, and that estradiol did not cause female rats' skulls to differentiate.

Crelin and colleagues hypothesized that testosterone was the driving force behind pelvic sexual dimorphism, not oestrogen.[580] When experimenting on rats, they discovered that rats of either sex gonadectomised at birth and subsequently given testosterone developed male-type pelves, while those gonadectomised but not given any exogenous hormones developed female-type pelves. This means that in rats (and possibly in all mammals), the default, agonadal pelvis shape is that of the female. In addition, Jost showed that the default mammalian phenotypic setting in the absence of gonads was female.[581] This explains the more gracile, "feminine" (androgynous)

[578] (Pittard, 1934; Tandler and Grosz, 1909; Wagenseil, 1933a, 1927)
[579] (Dahinten and Pucciarelli, 1986)
[580] (Bernstein and Crelin, 1967; Crelin and Blood, 1961)
[581] (Jost, 1947)

appearance of castrates and other intersex individuals, and may help to explain the iliac splay of the castrate pelves, as the amount of testosterone needed to develop a male-type pelvis is unclear. However, it does not address the masculine morphological features of the castrate pelves, such as the subpubic angle and sciatic notch. Wagenseil argued that castrate pelves do not show female characteristics so much as delayed or halted development with concomitant excess enlargement due to prolonged growth.[582] It is possible that the morphologically sexually dimorphic features of the pelvis are formed early in life or that prepubertal castrates, while not producing enough androgens to completely sexually differentiate their skeletons or cease bone growth, still produce enough androgens from within the adrenal gland to make their pelves sexually dimorphic in at least these features.

This raises interesting questions about the nature of adrenal versus gonadal androgens in the sexual differentiation and growth of the human skeleton. The possibility that adrenal androgens drive pelvic dimorphism while gonadal androgens drive cranial dimorphism is supported by the fact that adolescent to young adult male crania can appear more gracile and feminine and older adult female crania can appear more masculine, while their pelves align more closely with their biological sex.[583] This would also provide an argument for the stronger weight of the pelvic girdle in osteological sexing. The idea of castrate skulls (and castrates in general) as expressing feminine characteristics, while somewhat valid, misses the nuances that are actually present in the differences between castrate, male, and female skeletons.

The fact that these subtle differences were previously missed or misunderstood (due in large part to the novelty of endocrinology and millennia-old social, cultural, and biological assumptions about developmental processes) has led to half a century or more of incomplete information on castrate physiology, which has made it more difficult to understand the developmental changes to the castrate skeleton and therefore to the detection of them archaeologically. It is possible that female castrates (or individuals with Turner's Syndrome) would present slightly differently than male castrates (more than likely they would possess shorter limbs), but the fact that the default state for mammalian development is female indicates that the castrate phenotype should hold somewhat stable for intersex skeletons, with small variations from adrenal hormones.

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[582] (Wagenseil, 1933a)
[583] (Meindl et al., 1985)

More work must be done on the age, timing, and origin of the hormones responsible for morphological sexual dimorphism in order to more clearly understand these differences.

It may be possible to estimate the age at which an individual was castrated through the use of linear enamel hypoplasia. Tooth enamel forms during the development of the tooth, and metabolic, physical, or emotional stress can cause disruptions in the formation of enamel on tooth surfaces, resulting in enamel defects. One such defect is linear enamel hypoplasia, a linear band of thin enamel on the crown of the tooth. It has been proposed that the age at which a specific band of hypoplasia occurred could be estimated based upon the distance of the band from the crown of the tooth, taking into account estimations of crown height.[584] It is possible that bands of enamel hypoplasia on castrate teeth can be used to indicate not only poor diet in childhood, but also the age at which castration occurred. If bands of hypoplasia are found on late-forming teeth, such as the molars (as in the Lyon castrate), they may be due to the trauma of the castration.

Interestingly, the chimpanzee femur is a better indicator of castrate status than the tibia, which is the opposite of humans. It is possible that prepubertal castration in chimpanzees affects the distal portions of the limbs less than it does in humans, but that it does affect the proximal portions of the body, such as the femur, more. That the leg length in castrates is shorter than in intact males may be related to the differences in general body proportions between chimpanzees and humans, as chimpanzees generally have longer arms and torsos and shorter legs relative to stature.[585] It is also possible that the sample size was too small to begin to detect the differences in the lengths of castrate long bones, and that the five non-castrated chimpanzees that had undergone alternative testing blurred the signal given by the long bones. If the stature of the chimpanzees could be calculated, the leg length and sitting height could be more directly compared to the human measurements. It is unlikely that the sum of the chimpanzee thigh and tibia lengths corresponds exactly to the pubic symphysis measurement in humans, but it should approximate that measurement to some extent.

In creating a new statistical method for calculating stature, Sjøvold discovered that the mean values of stature and long bone length from both male and female Caucasians were highly correlated, something he attributed to the apparent adaptation of

[584] (Reid and Dean, 2006, 2000; Ritzman et al., 2008)
[585] (Bogin and Varela-Silva, 2010)

body proportions to stature, regardless of any sexual modifications to stature.[586] If this is the case, and bodily proportions adapt to stature during growth, what are the implications for castrates? The anthropometric studies noted a distinct *disproportion* in castrates, stemming from the overly long legs in comparison to the relatively normal torso.[587] But is this really a disproportion, or merely the adaptation of castrates' skeletons to the continued growth of the long bones?

This proportional bias may be part of the reason that castrate and intersex individuals have yet to be detected archaeologically, as any skeletal disproportion would be missed in disarticulated, fragmentary bones, unusual burial positions, and general skeletal decay. As the practice of measuring skeletons for stature in the grave is considered to be less accurate than in-laboratory measurements of long bones and the application of regression formulae and therefore is rarely used,[588] any chance of identifying skeletal disproportion during excavation is limited to excavator observations. For this reason, a list of traits for easily identifying castrate status in the laboratory is outlined in **Table 7.1**. Primary traits are those which most strongly contribute to castrate identification, while secondary traits may indicate castrate status, but are not consistent in all examined castrates.

List of Traits for Identifying Castrates

| **Primary Features** |
|---|
| Open epiphyses |
| Erupted M3 |
| Worn teeth |
| Indeterminate Skull and Pelvis |
| Gracile bones |
| Broad diaphyses and narrow shafts in the long bones |
| Heavy mandible |
| Masculine subpubic angle and sciatic notch but laterally and posteriorly splayed ilia |
| Osteopenia or osteoporosis |
| Hyperostosis Frontalis Interna |
| Large long bone length measurements |
| **Secondary Features** |
| Shallow mandibular notch |
| Prognathic dentition |
| Deep, "saddled" nasal root |
| Ovoid, doliocephalic cranium |

**Table 7.1: List of traits for identifying castrates.**

[586] (Sjøvold, 1990)
[587] (Koch, 1921; Pittard, 1934; Tandler and Grosz, 1910b; Wagenseil, 1933a, 1927)
[588] (Petersen, 2010, 2005)

The best method for identifying castrates in wider skeletal populations may be the use of statistical interrogations of the entire skeletal dataset. A wide range of measurements is taken when examining skeletons,[589] and these measurements can be used to differentiate the skeletons of castrates from intact males and females. Linear discriminant function analysis (LDA) and Mahalanobis distance discriminant function analysis (MDDFA) seem to provide good means of separating castrates from the wider population. The measurements used in the anthropometric LDA were all length-based, displaying the disproportions of the skeleton evident in living castrates. It was possible to get a good result using only length measurements in living individuals because the measurements involved entire portions of the skeleton, especially those most prone to disproportion (such as the pubic symphysis height). However, when one wishes to examine osteometric results, length measurements alone are no longer enough to clearly differentiate between castrates and intact males and females. This is because the range of length variation within and between ancestry groups can cover the range of elongation of castrate skeletons so that only those skeletons which belonged to very tall, often prepubertally castrated individuals, especially people of African or European descent, can be differentiated. Therefore, it is necessary to use not just long bone lengths, but also breadths and even shaft circumferences if possible. This may be because the changes to individual bones, while giving dramatic results, are actually quite subtle, which may be another reason that castrate skeletons are not identified more readily in skeletal populations.

The differences between the castrates within the analyses are likely due to a combination of factors such as diet, nutrition, and timing of puberty. Two factors that definitely affect the differences among the castrates are age of castration and ancestry, though this may be slightly biased, as all of the African castrates were prepubertal castrates, and the number of European castrates was very small. The consistent statistical designation of postpubertal castrates as castrates is surprising, as it would be assumed that the majority of long bone epiphyses should have fused by the time these individuals were castrated. Thus, one would expect the postpubertal castrates to more closely resemble and therefore group with the intact males. As discussed above, there is some evidence that puberty may have begun at a much later age in ancient and medieval

[589] (Brickley and McKinley, 2004; Buikstra and Ubelaker, 1994)

populations than in modern populations,[590] but a later onset of puberty or a delay to epiphyseal fusion caused by poor nutrition cannot account for the elongated measurements of all of the postpubertal castrates. It is possible that some of the castrates were already impotent or intersex, which might have contributed to their decision to become castrates, as is often the case for *hijra*,[591] but this is unlikely to describe all the individuals who were prepubertally castrated.

## 7.3 Toward the Archaeology of Castration

As in any archaeological analysis, the osteological detection of castrates cannot rely on one method alone. In order to best determine the castrate status of any skeleton, it will be necessary to assess the sexual dimorphism of the skeleton, the rate of epiphyseal fusion as compared to tooth growth and eruption, the overall morphological appearance of the skeleton, the specific morphological appearance of the skull and pelvis, and statistical tests of the measurements of the individual against the wider skeletal population from which they have derived. This will of course have to take into account ancestry, as castrates can stand out against the overall signal of a population, but are best separated through comparison with their own ancestry group. The majority of these features will be analysed post-excavation, but clues to castrate status may be discovered in the burial environment during excavation.

### 7.3.1 Suggestions for Fieldwork in Human Castrate Osteoarchaeology

The most important factor for the archaeological discovery of castrate skeletons during excavation is the knowledge of where castrates once lived and were employed in large numbers. This has been shown in **Figure 2.1**, but that map is based entirely on historical documentation, and therefore may leave out some regions. One recommendation might be that if the area in which an archaeologist is working used to be controlled by a strongly hierarchical system such as an empire, all excavators need to be aware of the possibility of encountering castrate skeletons. Even if the area may not have been under the control of strongly hierarchical societies, it would be beneficial to be aware of the changes to the skeleton caused by intersex conditions such as primary hypogonadism or androgen insensitivity syndrome.

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[590] (Parent et al., 2003)
[591] (Mukherjee, 1980; Nanda, 1999, 1994)

When excavating and recording burial contexts, it is necessary to pay close attention to the positioning of artefacts within the burial, as these may point to castrate status. Examples of such artefacts would be the jars used to hold the genitals of Chinese castrates or the plug used to prevent urethral strictures in complete castrates. It is possible that these plugs could be confused for shroud pins or even coffin nails, especially as some castrates are known to have used nails as plugs. However, as coffin nails are used to hold the lid to the body of the coffin, they should not be in the pelvic area, and any nail found in the pelvic area may indicate castrate status. Therefore, it is extremely important to be conscious of the positioning of such objects.

It may be possible to get a sense of disproportion from the skeleton in the grave. This would be most likely in skeletons that are supine and extended, as that would most closely resemble a living, standing individual. However, this would require that the skeleton be relatively complete, that it retain the majority of visible articulation (requiring careful excavation and no grave disturbance), and that the excavator examine it from a distance once it is excavated. In addition, as discussed in Chapter Six, when supine, castrate skeletons tend to lose the majority of the visible disproportion, except in the hands and feet. These bones can be very easily disturbed, and the hands are often arranged across the torso for burial, making any disproportion very difficult to spot. It is unlikely that other burial positions such as crouched/flexed would aid the detection of disproportion in the skeleton given their tight positioning and intermixing of skeletal elements.

Standard osteoarchaeological tools such as a four inch trowel, brushes, square and leaf trowels, bamboo skewers, paintbrushes, small scoops or dustpans, and a skeletal inventory sheet, including diagrams to mark the presence or absence of bones and parts of bones, would be required for the excavation of skeletons. If field measurements of the skeletons are desired or required, a set of standards, copies of recording sheets or ample paper, a sliding caliper, spreading caliper, and osteometric board will be required. A camera, scale, and single colour backdrop (preferably in a dark colour to contrast the bone) will be required for photographs. Characteristics to look for in possible castrate skeletons include open epiphyses of almost all long bones with erupted and worn third molars, signs of kyphosis in otherwise young-looking skeletons, and extremely long and gracile long bones. If it is possible to examine the interior table of the frontal bone, investigators should look for signs of *Hyperostosis Frontalis Interna*. If conflicts between ageing methods such as tooth eruption/wear and epiphyseal fusion are found in

the field, it would be best to note these characteristics clearly on context sheets and the skeletal inventory so that the skeleton can be more closely examined in post-excavation.

### 7.3.2 Suggestions for Laboratory Work in Human Castrate Osteoarchaeology

When working in the laboratory, a set of standards, copies of recording sheets or ample paper, a sliding caliper, spreading caliper, tape measure or soft tape measure, and osteometric board will be required. A camera, scale, and single colour backdrop (preferably in a dark colour to contrast the bone) will be required for photographs, and a dental mirror and small, preferably flexible, bright flashlight that can be inserted into the cranium would also be beneficial. If available, an endoscope could be used instead of the dental mirror and flashlight.

Macroscopic recording of human remains should follow at least one of the two sets of standards published in the last twenty years.[592] Brickley and McKinley closely follow Buikstra and Ubelaker's format, but use updated methods somewhat tailored for European (specifically United Kingdom) populations. The macroscopic examination of the human skeleton in both of these standards includes the recording of a series of skeletal measurements, age and sex assessments, morphology, non-metric traits, pathology, and dental morphology and pathology. In cemetery populations, this data can be used to create demographics for the cemetery, allowing larger conclusions about the population to be made. The ageing methods categorise morphological changes to the skeleton that occur during growth and development, such as epiphyseal fusion, tooth eruption, skull suture closure and degenerative changes to the joints. Sexing methods categorise morphological changes to the skeleton due to the effect of hormones released at puberty, which trigger the secondary sex characteristics. Care should be taken to take long bone lengths, shaft diameters and circumferences, and diaphysis breadths. In addition, the skull measurements recommended for FORDISC analysis should be taken,[593] as well as the ossa coxae measurements recommended in Buikstra and Ubelaker, if possible.[594] This will allow for the most in-depth datasets for examination and more clearly show castrates during statistical analysis.

[592] (Brickley and McKinley, 2004; Buikstra and Ubelaker, 1994)
[593] (Elliott and Collard, 2009)
[594] (Buikstra and Ubelaker, 1994: 82)

Prepubertal castrates cause a discrepancy among ageing methods, as the lack of hormones can cause the epiphyses to remain open into the eighth decade,[595] while the teeth continue eruption and wear at the normal rate. This will mean that the teeth of an older castrate could be very worn, indicating an old age, while their epiphyses could still be unfused, indicating that they were in their late teens or early twenties at time of death. This discrepancy should be noticeable in a laboratory setting, but it is possible that osteologists, who might assume that the individual was consuming a diet high in gritty foods, would dismiss it. If a prepubertal castrate has heavy joint wear, open epiphyses, and worn teeth, giving two indicators of older age and only one of younger age, the conclusion would be contradicted.

Sexing methods rely on the morphological changes to the skeleton caused by the hormones at puberty. They normally concentrate on the pelvis and skull and characterise individuals based on their relative robustness or gracility. As was seen in Chapter Six, the castrate skulls and pelves have a mixture of feminine and masculine traits, which likely lead to their being classified as indeterminate skeletons, a category that is rarely used in larger analyses of cemetery populations. Important features to note in castrates are the degree of iliac splay in relation to the true pelvis inlet dimensions and heavy mandibles on narrow, tall faces with otherwise feminine characteristics.

In effect, prepubertal castrate skeletons sit on an axis of skeletal development between males and females and between adults and children, as illustrated in **Figure 7.1**. Therefore, if a skeleton is displaying indeterminate sexual dimorphism and discrepancies in ageing, close attention should be paid to the overall skeletal morphology, craniofacial morphology, the degree of osteopenia or osteoporosis, how gracile the skeleton appears, whether there is any excess elongation of long or short bones, and whether any indication of *Hyperostosis Frontalis Interna* is readily apparent.

[595] (Belcastro et al., 2011)

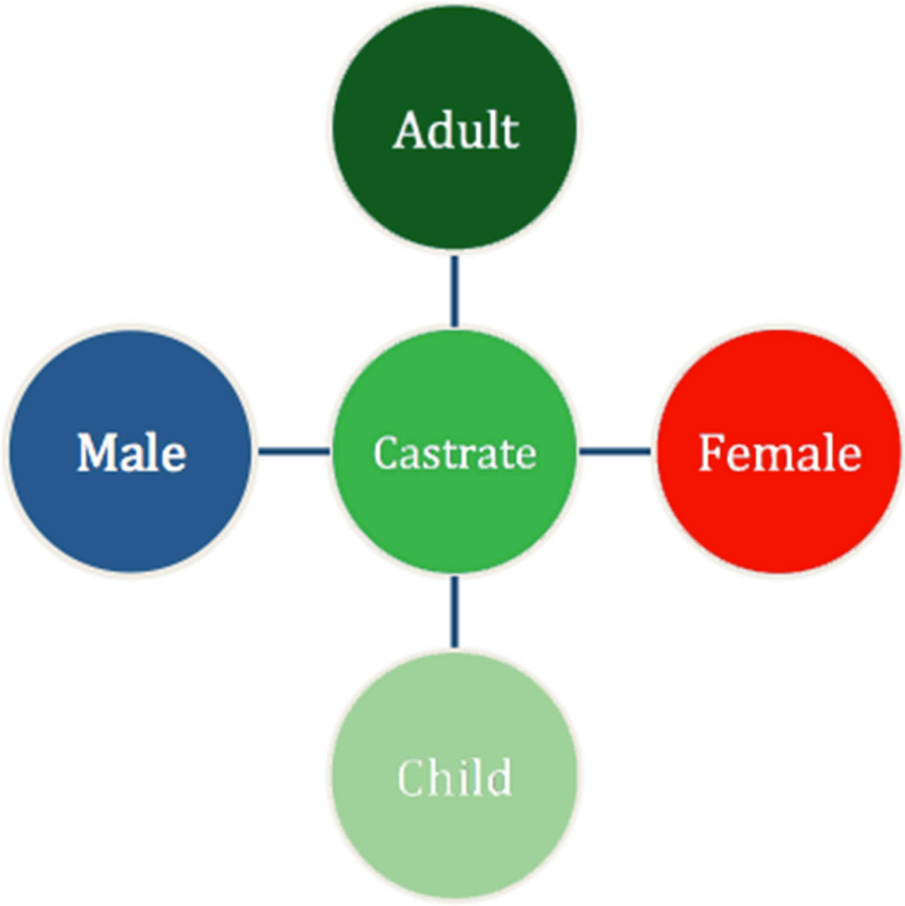


**Figure 7.1: Axis showing the skeletal development position of prepubertal castrates.**

In addition to cataloguing morphological and degenerative changes to the skeleton, measurements of the bones of the skull, the long bones, the clavicles, scapulae, the sacra, the ossa coxae, and the calcanei should be recorded in order to provide measurements for conversion to stature, shoulder, and pelvis anthropometric measurements. As was shown in Chapter Six, it is very important for statistical analysis to have breadth measurements of the long bones as well as the length measurements. Those measurements that have been found to be the most useful or important for detecting castrates osteologically are the femur, tibia, humerus, radius, and ulna.

Once the skeletal measurements have been obtained, discriminant function analyses can be performed to determine whether castrates exist within the population. Linear discriminant function analysis is useful for separating groups within a large cemetery population, but Mahalanobis distance discriminant function analysis may prove more useful for categorizing unknown individuals in comparison to known castrate data. As more castrate skeletal data is acquired, improvements to the analysis of unknown skeletons will be made. If it is thought that a skeleton of a castrate has been found, stable

isotope analysis could be used to characterise dietary status and mobility. In addition, it may be possible to use the nuclear DNA and new high through-put DNA techniques to analyse the genome of the skeleton for genetic conditions which may have led to an intersex skeleton.

Checklist of Castrate Features

| Present? | Primary Features |
|---|---|
| | Open epiphyses |
| | Erupted M3 |
| | Worn teeth |
| | Indeterminate Skull and Pelvis |
| | Gracile bones |
| | Broad diaphyses and narrow shafts in the long bones |
| | Heavy mandible |
| | Masculine subpubic angle and sciatic notch but laterally and posteriorly splayed ilia |
| | Osteopenia or osteoporosis |
| | Hyperostosis Frontalis Interna |
| | Large long bone length measurements |
| | |
| | **Secondary Features** |
| | Shallow mandibular notch |
| | Prognathic dentition |
| | Deep, "saddled" nasal root |
| | Ovoid, doliocephalic cranium |

**Table 7.2: Checklist of castrate features for the field or laboratory. Not all features must be present for castrate status, but at least ten should be present to assign castrate status.**

A checklist of features that may be used in the field or laboratory to determine castrate status in skeletal populations can be found in **Table 7.2**. The list is divided into primary and secondary features. Primary features are those that are most likely due to prepubertal castration and a majority of these features should be found in a prepubertal castrate skeleton. No particular weight is given to any one of these features, as not enough skeletons have been available for examination to determine which are more important than others. The secondary features are those that might be due to prepubertal castration, but are not consistent across all castrates studied. Their presence may help indicate castrate status, but must be accompanied by a majority of primary features. Factors that may affect how the changes to the skeleton are expressed include the age of castration (prepubertal, midpubertal, or postpubertal), ancestry differences (European, African, Asian, or mixed), and poor diet or nutrition.

## 7.4 Conclusion

This thesis is an attempt to make archaeologists aware of the large temporal and geographical span as well as the social and historical importance of castration. It has also attempted to provide a better understanding of the changes to the skeleton caused by prepubertal and postpubertal castration so that castrate skeletons may be identified from archaeological contexts, recorded, and published, contributing to a better understanding of castrates, castration, and their histories. Castrates were people who were "shunned" by the rest of society because of their highly visible differences. Though seen by some as repulsive, greedy individuals, castrates also were considered by others to be highly useful, prized servants in hierarchical structures such as religious and imperial court systems. Due to the extremely hostile attitude shown to castrates in historical sources by intact male elites and a sense of moral and cultural superiority on the part of authors in the West in the 19th and early 20th century, Western discussions of castrates and castration were couched in highly prejudiced language, even when using castrates for research in developing fields such as endocrinology and anthropometry. In light of the almost constantly negative view of castrates by male elites, it is curious that they were retained within imperial institutions for such a long time. This may have been due to the hierarchical structure of imperial institutions, which made castrates a necessary presence.

The social and gender roles of castrates have been very well studied, and they were largely based on the liminal and ambiguous position of castrates within sex and gender schemas in their societies. Though castrates are often discussed as a unified, monolithic group, it is unknown if individual castrates felt any deep sense of belonging to or close identification with their own group. There are some indications of fellow feeling between castrates, but most castrate actions as recorded by external, male, elite sources indicate that castrates were more focused on personal (or sometimes familial) benefit. There is much that is not currently understood about the social aspects of castrates' daily lives, but the introduction of archaeology to the study of castration may be able to aid the search for answers.

Castrate skeletal remains provide the best, clearest window into the daily lives and treatment of castrates, but few are recovered archaeologically. This is in part due to a lack of knowledge on the part of osteoarchaeologists. However, a large number of the geographical areas in which castrate skeletons might be recovered are controlled by governments or religions that prohibit the excavation and extended study of skeletal

remains. In addition, given the close links castrates shared with imperial regimes, discussion of castrates and study of their remains can be actively discouraged.

The morphological changes to the skeleton caused by prepubertal castration were highly visible during a castrate's life, contributing to their overall social status and role. These changes remain in the skeleton and can be detected by osteoarchaeologists. They include delayed epiphyseal fusion leading to exaggerated elongation of the long bones, delay in craniofacial and pelvic development, indeterminate development of the sexually dimorphic features of the skeleton, and early onset of osteopenia and osteoporosis. In addition to using the morphological changes to the skeleton to detect prepubertal castration, statistical analyses of the skeletal measurements can be used.

Zooarchaeologists use statistical analysis to separate castrates from intact male and female animals in archaeological skeletal assemblages in order to better understand herd maintenance practices in the past. Similar methods have been used on the human castrate anthropometric and skeletal data in this study (**Chapter 6**). In addition, discriminant function analysis was used to separate and classify the individuals in the datasets. It was found that castrates could be clearly differentiated from intact males and females in the anthropometric dataset using only length measurements, but that at least breadth measurements, and preferably also shaft circumference measurements, were needed to gain the best separation among the groups in the osteometric datasets. In order to make the statistical analysis of castrates as accurate as possible, large amounts of data are needed, as linear discriminant function analysis and Mahalanobis distance discriminant function analysis are more accurate with large sample sizes and several variables.

Several important topics for general osteological consideration are suggested by the research undertaken for this thesis. Foremost is that researchers who undertake examinations of skeletal collections should be required to submit copies of their raw data to those collections. One of the reasons that better comparative data for the Lyon castrate and Nekht-Ankh were not obtained was that the skeletal collections that housed a number of East African skeletons did not have their own database of skeletal measurements for those collections. As funding, time, and resources to study collections are sparse even in the best-funded institutions, a requirement that such raw data or skeletal reports be supplied to the repositories of the collections would aid other future large-scale comparative studies significantly. Another problem highlighted by this study is a general lack of cooperation in sharing skeletal material or data. It was difficult to

gain access to even the data for some of the skeletons used in the analysis, and some material was not available at all. In addition, an online skeletal database containing the raw data from skeletal collections would aid comparative studies and provide large amounts of data that could be used to study temporal population trends worldwide. It is difficult to state who would or could host, maintain, and control access to this database, as it would be an expensive, time-consuming process, but the overall benefit to osteoarchaeologists would be immense.

The study of the origins and history of castration as well as the effects of castration on the development of the male mammalian skeleton has profound effects on agricultural production, human history, and medicine. The practical applications to agricultural production include the ancient use of castrated animals as draught labour, and in the ancient and modern periods, improved wool and longer growth periods for meat production. The study of castrate bodies, already shown to have greatly contributed to the birth of endocrinology, gives insight into serious medical conditions and the development of the skeleton of individuals with genetic or hormonal conditions. As some castrates played vital roles in religious and governmental structures and guided policies that affected world history and therefore shaped the modern world, it is important to study them to understand their contributions. Knowledge of the social systems surrounding the use of castration and castrates will provide better understanding of the motivations and decisions of castrates, which will lead to a better understanding of world history.

Possible further work from this project includes tracing the trade routes of the castrate slave trade. Several castration centres and origins of castrate slaves are known, and as the sale of castrated slaves was lucrative, there were strong economic motivations for engaging in it. As wealth tends to lead to power, examinations of castration centres, trade, and traders will give a more nuanced understanding of the social power and dynamics between the merchant and noble classes in the past. If more castrate skeletal data can be found, a better calibration dataset can be created and used to determine whether skeletons in various skeletal populations might be castrates. The dataset in its current form could be used to examine the skeletal remains from Ephesus, Turkey, a city which hosted a temple to Cybele and slave market which sold castrated slaves as well as the indeterminate skeletal remains from currently published skeletal reports. The development of a method to detect hormones within archaeological bones could be used

to sex skeletons within skeletal populations, highlighting individuals with low hormonal concentrations for further study.

Castration has a long and varied history and spanned large areas in Africa, Europe, and Asia. Castrates often served in imperial courts or religions, which gave a small number of them incredible wealth and power. This power was often used to direct governmental policies, shaping the course of world history. The ability to detect castrate skeletal remains within wider skeletal populations, as shown within this thesis, will allow the identification of not only known individuals, such as the *praepositus* and vizier or the patriarch and priest, but of the castrate tutor, the kitchen servant, or the harem attendant. The skeletons of these individuals will not only give us greater knowledge of castrate lives, deaths, and burials, but will also greatly increase our knowledge of their societies and their role within those societies, which were often the cultures that have contributed the most to world history and our modern society. In this sense, the history of castration is the history of the modern world.

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