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ABSTRACT
The preponderance of men in the narrative of anatomical education during the 1800s has skewed the historical perception of medical cadavers in favour of adult men, and stifled the conversation about the less portrayed individuals, especially children. Although underrepresented in both the historical literature and skeletal remains from archaeological contexts dated to the 1800s, these sources nevertheless illustrate that foetal and infant cadavers were a prized source of knowledge. In the late 1700s and 1800s foetal and infant cadavers were acquired by anatomists following body snatching from graveyards, from the child’s death in a charitable hospital, death from infectious disease in large poor families, or following infanticide by desperate unwed mothers. Study of foetal and infant remains from the 1800s in the anatomical collection at the University of Cambridge shows that their bodies were treated differently to adults by anatomists. In contrast to adults it was extremely rare for foetal and infant cadavers to undergo craniotomy, and thoracotomy seems to have been performed through costal cartilages of the chest rather than the ribs themselves. However, many infants and foetuses do show evidence for knife marks on the cranium indicating surgical removal of the scalp by anatomists. These bodies were much more likely to be curated long term in anatomical collections and museums than as was case for adult males who had undergone dissection. They were prized both for demonstrating normal anatomical development, but also congenital abnormalities that led to an early death. Our findings show that the dissection of foetal and infant cadavers was more widespread than previous research on anatomical education suggests. This research details the important role of the youngest members of society in anatomical education during the long nineteenth century, and how the social identity of individuals in this subgroup affected their acquisition, treatment and disposal by elite medical men of the time.

INTRODUCTION
In 1877 Flora McLean gave birth in a Lying-in Hospital in Glasgow. McLean complained about the neglectful treatment of her baby and two days later the infant died. Some time later Flora got out of bed to go to see the body of her deceased infant in another room before the burial. Upon entering the room, to her dismay she found the body of the infant had been dismembered and sewn back together again. She had paid the ten shilling burial fee required for a proper burial and was distraught at the state in which she discovered the mutilated body. Upon seeing her baby in that state, McLean became irate and berated several hospital employees about the inhumane treatment of her baby. The police were ultimately informed and the body of the infant was found at the hospital in the condition that McLean described. An investigation was launched into the goings on at the hospital and a warrant was issued to examine the body of the infant. When the doctors in charge of the investigation, Dr Moore and Dr Dunlop, arrived to examine the body they found that the head of the infant had been subsequently severed and they were unable to immediately locate it. Through the investigation it was uncovered that the head, and later the body was taken to the Royal Infirmary for dissection without the consent or knowledge of Flora McLean (Southern Reporter and Cork Commercial Courier, 1877: 2).

The socio-political climate surrounding human dissection in the 1700s and 1800s has been thoroughly examined by historians (Richardson, 1987; Hurren, 2012). This body of research reveals that in general the public reaction to human dissection was almost exclusively negative outside of the medical community. The story of the McLean
baby highlights one of the major themes commonly investigated within the context of anatomical education during the nineteenth century: the fear of human dissection. The horror and disgust instilled in the populace by this sensational tale concerning the unauthorised use or retention of a loved one are not unique, nor are they limited to the distant past. The relatively recent Alder Hey scandal caused by the retention of organs in UK hospitals echoes these historic fears (Ellis, 2004: 42-43). Throughout the nineteenth century stories of concealed dissections and stolen bodies plagued the thoughts populous. Yet, amid this public outcry, dissection practices only increased in frequency. The direct examination of the body by students through either human dissection or by examining anatomical preparations in medical museums was deemed necessary for students to gain a spatial and tactile understanding of the human body. By the late 1700s, well before the dissection of the McLean baby, the undeniable educational value of dissection had caused this practice to become entrenched in anatomical education (Dittmar and Mitchell, 2015a).

Within the majority of the research on human dissection, cadavers are generally portrayed as adult men from a low socio-economic status, with adult women from a similar background appearing occasionally (Hurren, 2012; Hutton, 2013). It is perhaps unsurprising that the majority of the research on anatomical education features adults, specifically men. From its inception, the bodies of men have generally been at the centre of the discussion about dissection. Within the context of medical education men played all of the roles; educator, dissector and dissected. The male form has predominately been featured in the dissection manuals and was most commonly depicted in the media. The preponderance of men depicted in the medical literature and within historical research has skewed the historical identity of medical cadavers as adult men and has stifled the conversation about the less portrayed individuals, specifically children. The role of young children, particularly foetuses (3 gestational months - birth) and infants (birth to 1 year postpartum) in anatomical education has received very little attention.

The historical literature from the 1700s and 1800s showed that foetal cadavers were valued for the study of growth and development, and were often kept in anatomical museums (Hunter, 1774; Humphry, Unpublished; Duckworth, unpublished). The valuable and unique knowledge that could only be obtained from the examination of these developing bodies made them essential to the study of anatomy. Due to their importance and presence in medical museums it is highly unlikely that foetal and infant bodies were dissected to destruction, but very little evidence of this practice remains in the archaeological or historical record. When the bodies of children are briefly mentioned in historical research about anatomical education, they are generally as part of a discussion of cadaver acquisition (Hurren, 2012). The lack of widespread information surrounding foetal and infant bodies has caused this group to be largely overlooked in the on-going research about anatomical education in the 1800s. Subsequently, minimal research has been undertaken on how their unique socio-political identity affected their use and treatment by medical professionals.

During the eighteenth and nineteenth centuries children, especially the illegitimate, had a particularly marginalised role in society. Many factors affected this position and their subsequent treatment including the high infant mortality rate during the early nineteenth century. Infant deaths were not the uncommon, shocking event that they are today. The stillbirth and premature death of infants was an all too common occurrence and it has been argued that the likelihood of the death of a child affected
the attachments formed by the parents (Ariès, 1979). This effect was magnified in the
mothers of illegitimate children because of legislative actions against them and their
illegitimate children in the form of ‘the New Poor Law’ (Anonymous, 1834). The
law ended financial support from both the parish and father of the illegitimate child
(Higginbotham, 1989). This loss of support in addition to the loss of job opportunities
experienced by the mother threatened both her and her infant’s life. The desperate
financial situations in which mothers found themselves, resulted in not only decreased
attachment to a pregnancy, but also in malicious actions against it. An extreme
example of this is illustrated by examples of miscarried foetal remains or deceased
infants, possibly the victims of infanticide, being given or sold to anatomists
(Withycombe, 2015; Hurren, 2012).

The lack of infant bodies presented in the historical literature is not surprising, but it
is also not representative of the important and unique role that foetuses and infants
had in anatomical education. This paper puts forward additional information about the
socio-political climate surrounding foetuses and infants in a medical context by using
a combined osteological and historical approach. The combination of historic and
archaeological evidence is needed to provide a more complete picture of the role
infants and foetuses had in anatomical education during the late eighteenth and
nineteenth centuries. The most effective way to undertake an examination of the
treatment of the bodies in this subgroup is to examine the bodies themselves. The
skeletal remains of foetal and infant cadavers excavated from archaeological sites or
preserved in medical museums are a rich and unstudied resource, which allow us to
recover the experiences of the individuals in this age group. This will be
complemented by an examination of historical sources and previously published
literature in order to explore how the social identity of infants and foetuses increased
the likelihood that they would be acquired, how they would be treated, and how their
bodies were disposed of by elite medical men during the long nineteenth century.

ACQUISITION OF CADAVERS

It is clear from the research into the procurement of cadavers during the eighteenth
and nineteenth centuries that this was considered the primary challenge for anatomical
education. The acquisition of bodies for anatomical education has been extensively
studied since the publication of Ruth Richardson’s seminal work on the socio-political
climate surrounding the Anatomy Act in 1832 (Richardson, 1987). This large body of
work elaborates on the difficulty anatomists faced in securing sufficient numbers of
cadavers and the ways in which they tried to overcome this. From the mid 1500s to
the end of the 1800s, restrictive legislation on cadaver procurement resulted in a long
history of the procurement of cadavers through nefarious means.

The examination of both archaeological and historical sources reveal that the bodies
of men were much more commonly acquired and dissected than those of women or
children. The imbalance in the demographics of dissected individuals linked to the
legal history of the practice and the sources from which bodies were acquired. The
legal history of human dissection in England can be traced to 1540 when Henry VIII
granted four hanged felons to the United Companies of Barbers and Surgeons for
dissection (Anonymous, 1540). Following this, the Charter for Anatomies in 1565
granted a group of physicians and surgeons of the College of Physicians the bodies of
four criminals per annum for dissection (Anonymous, 1565).
These eight hanged felons, almost entirely men, comprised the entire legally available supply of medical cadavers until 1752 with the passing of An Act for Better Preventing the Horrid Crime of Murder or ‘Murder Act’ (25 Geo. 2, c.37, 1752) (Anonymous, 1752). This act gave anatomists the right to dissect the bodies of murderers publicly to deter the ‘horrid crime of murder’.

The Murder Act, perhaps unintentionally, cemented the connection between adult men and the dissection table. Eternal punishment in the form of dissection was generally reserved for the most heinous crime of murder for which women and children were rarely convicted. This made the legal availability of female cadavers very rare compared with those of men. Women were occasionally hanged, of course, and subsequently dissected. From 1800-1832, only seven of the forty-five dissections preformed by William Clift at the College of Surgeons were women (MacDonald, 2006). Many of the women sentenced to death were found guilty of the most horrifying type of murder, infanticide. In alignment with the societal norms, a convicted, pregnant woman destined for the gallows would be granted a stay of execution until after the birth. The unique stipulation of pregnancy as a means to promote life and protect the innocent provides a morally consistent reason as to why the 1752 legislative change did not facilitate the acquisition of foetal or infant cadavers (Anonymous, 1752). Infant cadavers for dissection would have likely not been available through legal channels prior to the passing of An Act for Regulating Schools of Anatomy (2&3 Will. IV c.75, 1832) or the ‘Anatomy Act’ in 1832 (Anonymous, 1832) but it would have always been possible to access them through illegal channels in the same way as illicit adult cadavers.

**Resurrection**

Even with the passing of the Murder Act in 1752 the bodies of these felons hardly made a dent in the ever-growing demand for bodies to dissect during the late 1700s and early 1800s (Anonymous, 1752). Between 1805-1820, 1,150 people were executed in Britain, an average of 77 per year (Ball, 1928:46). However, according to the Report of the Committee appointed by the House of Commons to enquire into the manner of obtaining subjects for dissection in the Schools of Anatomy in 1828, there were over 800 students attending the Schools of Anatomy in London dissecting 450-500 bodies a year (Great Britain, 1828). The disparity between the number of legally available cadavers and the number required for anatomical education triggered the rise of the resurrectionists, or grave robbers. These men, often members of gangs, were infamous for digging up freshly buried bodies from graveyards or breaking into houses and stealing the deceased from the coffin while awaiting burial (Great Britain, 1828). Bodies obtained through illicit means became the main source of dissection subjects before the passing of the Anatomy Act.

The legal channels through which human dissection material was obtained were insufficient to meet the needs of the medical sciences, not only in numbers but also in the age and sex of bodies needed to fully investigate the variation and the growth of the human body. The bodies of women would have been rarely available from the gallows and the bodies of children would have been completely unavailable. However, this was not the case with illegally acquired cadavers.

There exists only one first hand account detailing resurrectionist activity, The Diary of a Resurrectionist (Bailey, 1896). This recounts how bodies of adults, referred to as ‘large’ were resurrected far more commonly than those of children, ‘small’ or
foetuses. The presumed author of the diary, Joseph Naples, stated in an interview to the Select Committee on Anatomy that his gang acquired 360 adults\(^1\) and 44 ‘smalls’ in 1809-1810 and 332 adults and 47 ‘smalls’ in 1810-11. This trend was continued in 1811-1812, with 360 adults and 56 children resurrected, but only 9 foetuses. One key explanation for this was the price a larger body could fetch. ‘Small’ bodies (under 3ft long) were paid for by the inch. These prices ranged from £1 0 0 to £1 10 0, whereas the average price of an adult body was stated to be £4 4s 0d, but as high as £7 17 6d (Bailey, 1896; Great Britain, 1828). The work by Hurren (2012) on the St Bartholomew’s Hospital registers revealed that 1% of the bodies sold for dissection were below the age of ten. Although it is clear that infants were resurrected, this method was not the main source of foetal material.

Unclaimed Bodies allocated by the Anatomy Act

Medical men continued to rely on the gallows and resurrectionists for bodies to dissect until the passing of the Anatomy Act in 1832. The introduction of this new legislation in 1832 provided a more plentiful supply of bodies, by permitting masters of workhouses, hospital managers and Poor Law guardians to donate unclaimed bodies of the poor. The socio-political ramifications of this act on the poor have been extensively researched (Richardson, 1987). This act was not only exploitative to the poor, but also largely ineffective in ceasing the trade in bodies. Although the intentions of this act were put in place to prevent grave robbing and other deceitful methods of obtaining the bodies of those who did not want to be dissected, the enforcers of this act did not have the power to effectively do this and bodies continued to be obtained through nefarious means (MacDonald, 2009; Hurren, 2012).

Following the passing of the Anatomy Act, the primary source for unclaimed bodies were the large voluntary hospitals. These charitable institutions founded during the eighteenth century had varied criteria for admittance but very few permitted entry to pregnant women, children or those deemed ‘incurable’. The findings of archaeological investigation at institutions like the Royal London Hospital and the Newcastle Infirmary reflect these strict entry policies, as the majority of the population of theses hospital burial grounds were adults, of which, less than one third were women (Fowler and Powers, 2012; Chamberlain, 2012). The unclaimed bodies from these predominantly adult male institutions did very little to increase the availability of legally acquired infant bodies for dissection. A notable exception was the Foundling Hospital, established in 1739 by Captain Thomas Coram, which exclusively cared for abandoned infants. The mortality rates for infants surrendered to this institution during the second half of the eighteenth century were variable but far exceeded the equivalent rates for London (Levene, 2007). The bodies of these unfortunate children, if unclaimed by a parent, could be legally acquired for dissection.

Research into the populations of workhouses reveals that by the end of the nineteenth century the majority of the individuals present in workhouses were elderly adults, mostly men (Ritch, 2015). However, these institutions were used by entire families, and records support the presence of infants. Workhouses were inhospitable, desperate places that were nearly always lethal to infants. Jonas Hanway, a champion for the lives of poor children railed against the conditions of the London workhouses after he

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\(^1\) This number includes 37 bodies that were sent to Edinburgh, and 18 which the gang had in hand but were never used.
collected statistics between 1757 and 1763. The parish poorhouses and workhouses authorised by parliament had near a 100% mortality rate for infants, which led Hanway to lament that in these institutions the ‘poor infants were mowed like grass’ (Hanway, 1766). The ultimate demise met by so many infants was exacerbated by the lack of nursing facilities and care to support them. Upon arriving at a workhouse the infant would be handed off to either a ‘carelefs[s]s, worthlefs[s]s young female, or a decrepid old woman’ (Hanway, 1766:4). Such circumstances led Hanway to confirm the claims made by a parish workhouse‘…that of the 54 children born, and taken into their workhoufs[e, not one out-lived the year in which it was born...’ (Hanway 1766: 9). The deceased from these locations including the infants would have been given, or sold to the anatomists if unclaimed by their family.

Stillbirths & Infanticide
In the event that an infant was stillborn, certain financial circumstances would have promoted the sale of the body to an anatomist. Those from the lowest socio-economic ranks would have not been able to afford a proper burial for a stillborn infant. However, up until 1838 the law did not require a stillborn baby to be registered and a body could be easily sold to an anatomist through an intermediary. This loop-hole in the legislation that facilitated the sale of these bodies generally produced no formal records. Even at institutions where young bodies are reported, as is the case for St. Bartholomew’s Hospital, the actual number of infants purchased is probably underrepresented (Hurren, 2012). This has made it impossible to determine the exact number of stillborn infants or give any indication of the scale on which this trade occurred. Although it remains impossible to completely reconstruct the trade of stillborn infants, some of the information can be found in historic hospital records such as cause of death and origin of the body. Recent research by Hurren illustrated that even with this minimal amount of information, it is possible to gain insight into the experiences of the individuals involved in this trade (Hurren, 2012).

The opportunistic acquisition of deceased infants from the desperate poor during the nineteenth century was not limited to those infants who died of natural causes. During the eighteenth and nineteenth century illegitimate children had a particularly marginalised role in society, which often led to the inhumane treatment of individuals within this group. The proportion of illegitimate births began to rise in the 1720s and sharply increased in 1730s (Laslett et al., 1980). Concurrently, there was an increase in infanticide resulting from illegitimacy in the 1730s. This trend continued and increased over the next 100 years. Infanticide became even more of a problem during the Victorian era. Legislation aimed at controlling the costs of the continually increasing illegitimate birth rate was enacted in 1810 which was later replaced in 1834 with The Poor Law Amendment Act or ‘the New Poor Law’ (Anonymous, 1834). The New Poor Law ended parish outdoor relief for unmarried women and the availability of assistance from the father of an illegitimate child (Higginbotham, 1989). The mothers of these illegitimate children were then solely responsible for them until they reached 16 years of age. The New Poor Law was completely ineffective in curtailing the illegitimate birth rate. But this law did effectively contribute to the desperate social and financial situations that faced the mother of illegitimate children.

Many of the mothers directly affected by the New Poor Law were poor unwed women in service positions. Upon the discovery of their pregnancy, most of these women would have been forced to give up their positions and would have been subjected to
societal shame resulting in additional loss of opportunity. Without parish relief, as restricted by the New Poor Law, these women were left in desperate financial situations with no way to take care of an infant. This left very few options for these women, all of which were life threatening: the workhouse, prostitution, abortion and infanticide. Although some braved the workhouses or turned to prostitution, the social and financial repercussions for having an illegitimate baby introduced by the New Poor Law made the elimination of the foetus or infant an unthinkable yet practical option for many desperate women.

By the 1860s the infanticide in England reached epidemic proportions. There were times when inquests into the death of infants in Marylebone were held ‘nearly every day’ (Times, 24 October 1862: 6). The coroner for Central Middlesex, Edwin Lankester estimated that over a several year period in the mid-nineteenth century, ‘12,000 women, or one in 30’ had murdered their infants without detection in London (Medical Times and Gazette, 26 April 1866:446). These figures were slightly revised after he received intense criticism, but he maintained that ‘…in England and Wales there could not be fewer than 1,000 cases of infanticide annually’ (Times, 6 Oct 1866:12). The victims of this heinous crime were not uncommonly found in the streets or hidden away in unseemly places (Times, 22 Sept 1862:11; Times, 29 April 1862:8; Examiner, 9 Sept 1865: 576).

As reported by the special committee on infanticide by the Harveian Society, ‘…the life of the bastard is infinitely less protected than that of the legitimate…” (Lancet, 12 Jan 1867: 61). The particularly vulnerable social position held by these illegitimate infants in combination with the desperation felt by many poor mothers likely contributed to their ultimate demise and their use in anatomical education. In the light of the dismal options, many of the unwed mothers would have had a lesser attachment to unwanted infants. The corpses of unwanted infants, that were sold by a family member to anatomical institutions through intermediaries, were gladly accepted by anatomists as a source of dissection material.

Miscarriages and acquiring foetal material

The bodies of foetuses could be acquired by an anatomist through various interactions with the mothers, by examining the deceased, pregnant body post-mortem or through the examination of miscarried remains. Obstetric texts of the period indicate that both of these methods were necessary to construct a complete anatomical timeline from conception to birth. The eminent obstetrician and anatomist, William Hunter examined many women at different stages of pregnancy as well and ‘collected innumerable fresh miscarriages’ from as early as ‘the sixth week’ (Hunter and Rigby, 1843, p. 63).

Foetal material was invaluable to medical research in the nineteenth century but potentially difficult to acquire, just as today. The procurement of this material was dependant on the emotional response to a miscarriage experienced by women. For many childless women, a miscarriage was perceived as a tragic event that deprived them of the idyllic and revered position of motherhood. Although, historically miscarriages are generally presented as a devastating event, recent research reveals that a miscarriage elicited a number of emotions in women during and after the event. Among this variety of emotions was relief (Withycombe, 2015). The difficulties facing pregnant unwed mothers, described above, would disappear in the event that the mother miscarried. This regaining of control and opportunity could result in relief...
or even elation. Perhaps surprisingly, relief after a miscarriage was not only experienced by those in desperate personal or financial situations, but also by well-off, married women. These emotions of relief allowed for the miscarried foetal material to be acquired, generally by the doctor who attended the event (Withycombe, 2015). In many cases women willingly gave over the miscarried foetus to the doctor attending her. It has been hypothesized that women may have been comforted by a medical interest in seeking answers about reproduction (Withycombe, 2015).

The post-mortem examination of pregnant women, through dissection or autopsy provided a unique opportunity to examine a foetus in utero and an opportunity to extract foetuses for further study. Dissection of pregnant women was not the norm and the opportunity to dissect a woman and foetus under the unique circumstances, as depicted in William Hunter’s famous text, Anatomia Uteri Humani Gravidi Tabulis Illustrata (The Anatomy of the Human Gravid Uterus Exhibited in Figures) published in 1774, was incredibly rare. After the careful dissection or the examination of the abdomen in the case of an autopsy, the foetus could be removed, dissected and possible retained for a museum. Many of the specimens in medical museums were acquired in this manner: secretly and without consent. Extant collections including the Hunterian Collection and the Royal College of Surgeons, still house many organs harvested from post-mortem examinations (Richardson, 2000). These harvested foetal bodies were not only displayed in museums, they were also immortalised in published texts. William Hunter’s iconic early obstetric text featured the organs of fifteen women, seven infants, eight pre-term foetuses and supplementary material from miscarriages, some of which must have come from post-mortem examinations (McDonald and Faithfull, 2015; Hunter, 1774).

TREATMENT AND USES OF FOETAL AND INFANT BODIES

Medical cadavers of all ages were used in multiple ways in anatomical teaching including human dissection. Evidence of the treatment of bodies from a medical context can be assessed by examining the skeletal remains that have been retained in medical museums or excavated from archaeological sites. In recent years a number of excavations have uncovered skeletal remains with evidence of surgical cut marks consistent with human dissection (Chamberlain, 2012; Fowler and Powers, 2011; Kausmally, 2012; Mitchell, 2012; Webb et al., 2014; Western, 2012). Evidence of human dissection in archaeological assemblages is generally identified through the presence of tool marks on the bones.

In dissected adult skeletons, the most commonly identified procedures that indicate a post-mortem examination has taken place are craniotomy and thoracotomy. A circumferential craniotomy, the process of sawing open a skull in order to examine the brain, is the most commonly associated procedure with human autopsy and dissection in archaeological contexts. During the nineteenth century, a knife was used to cut the scalp, generally in a coronal direction. The scalp was then pulled down to reveal the cranial vault, which was then sawn around so the top of the calvaria could be removed and the brain examined. During this procedure sometimes a knife or saw was used to remove any soft tissues adhering to the bones of the skull. Although craniotomy was not always undertaken in dissection, either craniotomy or cut marks indicating scalp removal are generally required to make a convincing argument for dissection in skeletal remains without historical documentation. A thoracotomy is a procedure in which the thoracic cavity is opened in order to examine the internal
There is considerable evidence to support variation in this procedure during the eighteenth and nineteenth century, but commonly found evidence includes sawn clavicles, knife or saw marks on the manubrium and sternal elements, as well as sawn ribs (Figure 1).

**Dissection at Cambridge**

In recent years we have undertaken research analysing the skeletal remains of infants from the late eighteenth and nineteenth centuries showing signs of dissection. Our study of the skeletal collection retained from the Cambridge dissecting room (1768-c.1913) reveals that the age of the individual seems to dictate the role that each individual had in anatomical teaching and how the individual was treated (Dittmar and Mitchell, 2015b). Foetal and infant cadavers were used for student dissection, but these bodies were treated differently to individuals of other ages. Foetuses were not generally dissected before the 6th gestational month. We suspect this was due to the very small size of the individual before the 6th gestational month.

Evidence of the examination of a foetal head via a craniotomy was rarely found. Only one transverse craniotomy was identified on an infant skull in the Cambridge collection, out of a total of 54 foetal/infant specimens. Knife marks were much more commonly found on foetal and infant crania that had undergone dissection (44%). It is presumed the remainder were defleshed by non-surgical techniques such as boiling the cadaver. In those who had knife marks present, the location of the knife marks typically extended coronally over the cranial vault (Figure 2). These incisions are consistent with cutting the scalp with a knife and pulling the skin away to reveal the vault. Generally this preceded a craniotomy in adults, but clearly this was not the case for the vast majority of foetal remains.

Evidence of thoracotomies on foetal and infant remains are even more difficult to identify than craniotomies. Historical sources indicate the chest of infants was opened in a similar way to contemporary adults (Figure 1). The lack of tool marks indicative of this procedure found on skeletal remains suggest that the thorax was opened by transecting the cartilaginous portions of the ribs.

Although variation is seen in the treatment of bodies between age groups, the surgical instruments used in the dissection of foetal and infant bodies at Cambridge were similar to those used on adults. Evidence of both knives and saws were identified and in the case of the transverse craniotomy preformed on a foetus in the 38th gestational week, clear evidence that a saw was used to open the cranium was present (Figure 3). The morphological characteristics of the saw marks are consistent with a surgical saw with an alternate tooth set (Figure 4). This type of saw was used to perform craniotomies on individuals of all ages. However, the standard saws used to divide the ribs of adults would have been much too large to use on infant bodies. Special saws for the dissection of infants were not made because the end result could be achieved using different surgical tools already in existence, such as bone nippers or scissors.

**Anatomical preparations**

The procedural changes in the dissection of foetal and infant remains may have resulted from the importance placed on these bodies to medical museums. The skulls appear to have been intentionally spared to preserve them for teaching or display. Museums were particularly important to anatomical teaching, as they allowed for prolonged and careful study of preparations, both anatomical and pathological. These
The museum journey of foetal osteological preparations seems to have been different to that of an adult preparation. As seen in the former Cambridge anatomical collection, the osteological preparations of adult bones can go through several phases of use within an institution. Initially the body is dissected, then a single or multiple preparation is made from the body and put on display. After an unspecified amount of time this preparation may no longer be needed in a museum collection and may become a teaching preparation, or a handling preparation that is used by students to learn anatomy. In the event that a preparation is broken or no longer useful, it was discarded. This journey varies in length and is affected by many factors but may last for hundreds of years. Many teaching institutions retain the anatomical preparations created by founding members of the institution, such as the Hunterian Collections in London and Glasgow (Paget and Stanley, 1863; Fordyce et al., 1840). This journey is often much less varied and potentially shorter for infant skeletal remains. Due to their fragility they were more likely to be damaged if handled, so these elements were more likely to be hidden in a storeroom or discarded when no longer fit to display.

**Prized Museum Preparations**

During the eighteenth and nineteenth century abnormal bodies were featured in many exhibitionary contexts. The commercial exhibition of ‘Siamese’ or conjoined twins could be found among dwarves, giants, and hermaphrodites at establishments such as the Egyptian Hall, the Regent Gallery and the Rummer in Three Kings Court, Fleet Street (Anonymous, c.1880-1900). These living people were placed along side anatomical specimens and even occasionally great beasts to produce a spectacle of anatomical variation to serve both as a reminder of morality and for public amusement.

The fascination with ‘monsters’ was universal and even among medical men this type of preparation was collected and curated in many anatomical museums. This interest is clearly illustrated in the book, *Human Monstrosities*, published in 1891, which features developmental defects in foetuses (Hirst, 1891). Within medical contexts, the abnormal was not sensationalised for profit in the way that was seen in the commercial establishments. As a point of professional pride, anatomists remained...
detached and viewed these non-normative bodies through a scientific lens (Porter, 2001). In alignment with this calculated scientific approach, the term ‘monster’ that was liberally applied to the ‘abnormal’ by commercial outfits was refined within medical circles to the examination of physical malformations during the early embryonic development.

The rarity of malformed foetuses led them to be highly valued, even among other abnormal preparations. The unique niche held by foetuses that illustrated developmental defects led to the majority of the bodies being preserved intact. In comparison with preparations of malformed adult organs or organs illustrating a pathological process, preparations made from foetal bodies were much more likely to feature the body in its entirety. This is primarily because the most severe and often fatal congenital defects such as anencephaly (a congenital malformation where major parts of the brain and skull are missing) only exist in foetal form. Even in the event that a malformed foetal body was dissected prior to being put on display, the body would be stitched back together before being preserved in spirit and displayed (Hirst, 1891). This was not the case for adult bodies. Both convenience and necessity played a role in curatorial decisions when it came to the retention of entire bodies to illustrate congenital abnormalities. The lack of display space was a continual battle for many museum curators and practically, it is much easier to prepare, store and display a small jar containing a foetus than it is to do the same with an adult body.

**DISPOSAL**

Given that these bodies played an important role in anatomical education, the lack of archaeological evidence of individuals in this subgroup raises questions about the disposal practices used. Based on the unique and yet marginalised role that foetuses and infants played, it is likely that a combination of disposal methods were used for individuals in this group. However, even the conventional methods for disposing of dissected individuals do not always align with traditional burial practices. The disposal of bodies following dissection included burial in private or hospital burial grounds. The remains of dissected cadavers were supposed to be buried in a church burial ground for a ‘proper burial’. However evidence from archaeological sites does not suggest that these regulations were always followed. This was especially the case when the bodies were obtained through illicit means. For example, dissected individuals have been uncovered in pits behind hospitals (Western, 2012).

The majority of dissected skeletal remains uncovered in archaeological contexts indicate that disposal of bodies following dissection was primarily burial in private and hospital burial grounds (Mitchell, 2012). Burial of dissected remains was not always formal even within formal burial locations. Within allocated burial grounds, especially hospital burial grounds, the burial of dissected remains did not adhere to normative societal burial practices. It was not uncommon to place dissection portions into the coffin of another person or to bury a coffin containing mismatched human and animal body parts (Fowler and Powers, 2012). The concealment methods generally used to dispose of dissected bodies, especially before the passing of the Anatomy Act in 1832, were more effective in hiding the infant bodies than those of adults. Sections of bodies not belonging to the occupant of a coffin have been identified in archaeological excavations (Fowler and Powers, 2012). This was a money saving measure as well as an attempt to conceal the dissection of illicitly acquired bodies. The size of the body and legislation regarding burial practices of
foetuses and infants until the 1840s facilitated the treatment of these bodies as material waste.

**CONCLUSION**

This historical, osteological and archaeological assessment demonstrates that foetal and infant bodies played a larger role in the study of anatomy during the eighteenth and nineteenth centuries than was previously realised. These bodies were made uniquely available to anatomists by socio-cultural factors. Infant cadavers were often acquired via body snatching until the early 1800s, and after 1832 following a child’s death in a charitable hospital. However, they also became available through anatomists’ dissection of pregnant women, from the high mortality rates in infants from poor families at that time due to infectious disease, and following infanticide by unwed, vulnerable women in desperate circumstances.

Once acquired, the treatment of an infant body by anatomists was largely dependent upon whether the body was to be used in research or education. Foetal cadavers were valued for the study of growth and development, and were often kept in anatomical museums. Little archaeological evidence for dissection exists due to the manner in which foetuses and infants were treated by anatomists during the nineteenth century. The rarity of craniotomy in order to keep the skull intact, and ease of thoracotomy through cartilaginous parts of the ribs, means that many individuals who underwent dissection as a foetus or infant have probably not been identified at archaeological excavation. However, our research into the foetal and infant remains from 200 years ago in the Cambridge anatomy collection is starting to shed new light on how the youngest members of that society were studied by the anatomists of the time.

**REFERENCES**


Anonymous (c.1880-1900) *This is to Acquaint the Curious*. Handbill. London

Anonymous (1866) *Medical Times and Gazette*. April 26: 446.


Blondel JA (1729) *The Power of the Mother’s Imagination Over the foetus Examin’d*. London: John Brotherton.


Hanway J (1766) *An Earnest Appeal for Mercy to the Children of the Poor*. London: J Dodsley in Pall-Mall.


Pole T (1790) The Anatomical Instructor; or, An Illustration of the Modern and Most Approved Methods of Preparing and Preserving the Different Parts of the Human Body, and of Quadrupeds, by Injection, Corrosion, Maceration, Distention, Articulation, Modeling, &c. London: Couchman and Fry.


Social Science Congress. (1866) The Times. October 6:12.


Figure 1: Dissection of an infant c.1685. Engraving by Gerard de Lairesse published in Anatomia Humani Corporis by Govard Bidloo. Wellcome Library, London

Figure 2: Pattern of knife marks (in green) on a full term foetal skull (5752) from the University of Cambridge c.1911
Figure 3: Craniotomy and incomplete saw mark on the skull of (5741) from Cambridge, Duckworth Collection c.1911

Figure 4: SEM micrograph of an incomplete saw mark on the right parietal bone of a foetus in the 38th gestational week (5741) dissected at the University of Cambridge, c.1911