

The lives and deaths of young medieval women: the osteological evidence

Article

Accepted Version

Shapland, F., Lewis, M. and Watts, R. (2016) The lives and deaths of young medieval women: the osteological evidence. *Medieval Archaeology*, 59 (1). pp. 272-289. ISSN 1745-817X doi: <https://doi.org/10.1080/00766097.2015.1119392> Available at <http://centaur.reading.ac.uk/50813/>

It is advisable to refer to the publisher's version if you intend to cite from the work. See [Guidance on citing](#).

To link to this article DOI: <http://dx.doi.org/10.1080/00766097.2015.1119392>

Publisher: Taylor & Francis

All outputs in CentAUR are protected by Intellectual Property Rights law, including copyright law. Copyright and IPR is retained by the creators or other copyright holders. Terms and conditions for use of this material are defined in the [End User Agreement](#).

www.reading.ac.uk/centaur

CentAUR

Central Archive at the University of Reading

Reading's research outputs online



The Lives and Deaths of Young Medieval Women: The Osteological Evidence
By Fiona Shapland,¹ Mary Lewis² and Rebecca Watts³

WRITTEN SOURCES FROM THE MEDIEVAL PERIOD focus mainly on the activities of adults, particularly males and often those from the wealthier sections of society. Recent scholarship has attempted to redress this balance by giving attention to medieval women and children, but we are still limited by what we can learn about the daily lives of all members of medieval English society. Osteology, the study of human skeletal remains, suffers from no such bias and can provide substantial and detailed information on growth, health and daily life of the general population. This paper presents the results of a new analysis of the skeletal remains of over 300 medieval girls and young women aged at between 14 and 25 years from a number of English cemetery sites. We incorporate data from the published archaeological literature as well as documentary evidence to provide new insights into the lives and deaths of young medieval women.

Medieval adolescence as an important stage in the life course has received renewed attention in the last few decades,⁴ but this research focuses primarily on the better recorded lives of young men. As in virtually every period of history, women feature much less frequently in all forms of documentary evidence from the medieval period.⁵ This is especially true for the lower classes, as detailed sources on the lives of medieval women generally focus on the aristocracy or gentry, and women such as Margaret Beaufort⁶ or Margaret Paston,⁷ whose lives were far from typical. The daily activities undertaken and challenges faced by poorer young women remain largely unknown.

Osteology may provide part of the answer to this problem. Thousands of medieval skeletons have been excavated in England over the last half century, from a variety of cemetery contexts ranging from richly furnished burials within church buildings to mass plague graves. These physical remains provide a wealth of information on the lives and deaths of young medieval women. The number of female skeletons aged between 14 to 25 years excavated from English medieval cemeteries (c AD 900–1600) is approaching 930, providing a large dataset for analysis. Of these, 314 (33.7%) from five cemeteries across England have been recently re-examined. The samples were derived from: St Peter's Church, Barton-upon-Humber, Lincolnshire,⁸ St Mary Spital, London,⁹ St Oswald's Priory, Gloucester,¹⁰ and Fishergate House and St Helen-on-the-Walls in York.¹¹

DEFINING YOUNG MEDIEVAL WOMEN

The current analysis focuses on the medieval skeletons of girls and young women with an estimated age at death of between 14 and 25 years based on their dental and skeletal development.¹² They provide a snapshot of female health during a crucial period of their sexual maturity and fertility. The choice of this age range is partly practical; the assessment of sex in child skeletal remains is difficult, but from 12–14 years onwards becomes increasingly reliable as the separate elements that make up the pelvis begin to fuse and sexual differentiation in pelvic morphology can be assessed.¹³ At the other end of the age range are individuals who in modern terms would be considered fully adult. However, the period of 'youth' in medieval England, before the achievement of full social adulthood, may have extended well past physical adolescence, and the age of 25 years is often used as the cut-off point.¹⁴

It is difficult to deduce from documentary sources the age at which 'girls' formally became 'women' in medieval England. It is likely that the externally visible changes of puberty such as the development of breasts and hips would have changed the way in which girls were viewed by their community, but the age at which these changes took place would have varied considerably between individuals, just as in modern populations. In furnished early medieval cemeteries, adult female gravegoods appear in the graves of adolescent girls, suggesting that the physical changes of puberty were important in defining the female child-to-adult transition.¹⁵ Whether this was true of later medieval society where gravegoods are scarce, however, is hard to ascertain. The importance of female sexuality and fertility meant that sexual maturation was always much more closely tied to social adulthood for women than for men, but for most medieval young women physical adulthood did not equate to social adulthood.¹⁶ Instead, puberty may have marked the beginning of the phase of 'maidenhood' rather than adulthood.¹⁷

Lifestyle changes for the teenager, in particular the onset of formal work, may have marked a further step away from childhood, particularly if this involved a move away from the parental home. That the 14th-century poll tax was levied on all those aged 14 years and above suggests that young women were expected to be earning their own money by this age.¹⁸ Although exact numbers are impossible to calculate, it is clear from the documentary evidence that a significant proportion of young women migrated to urban centres such as London and York to obtain employment, most commonly a service position.¹⁹ This move would have been a dramatic, and potentially a traumatic, change in lifestyle for young women. Although it may have brought greater freedom and responsibility, it does not seem to have conferred full adult status; there is evidence that young women in service were always viewed as 'girls' regardless of their age, just as young men were not viewed as full adults before the completion of an apprenticeship contract.²⁰

One lifestyle change more than any other had the effect of altering a young woman's identity. Marriage is usually described as the decisive rite of passage to adulthood for medieval women.²¹ Although the legal minimum age at marriage in medieval England was set at 12 years, in reality, marriage at such a young age was largely restricted to the nobility, with the average age at marriage in the general population estimated at 20–25 years,²² and perhaps even later following the Black Death.²³ This would provide a very late age of achievement of 'adulthood' by modern standards. However, although marriage was very much the expected path for women, a significant minority — perhaps around 15% — never married.²⁴

Given this evidence, the biological and social period of 'adolescence' appears to have been drawn out, with medieval girls facing a series of lifestyle changes on their road to becoming young women. The following sections discuss how osteology can add to our current knowledge of the different facets of this transition in turn, starting with the physical changes of adolescent growth and puberty.

PUBERTAL DEVELOPMENT AND GROWTH

Growth and maturation are thought to have been much slower in the later medieval period due to a plethora of negative environmental factors: poor nutrition, widespread disease, poor medical care, and hard physical labour. Certainly, documentary sources highlight periods of famine and epidemic disease, which would have had a strong negative impact on growth and development.²⁵ Alongside these dramatic but infrequent events, most young medieval females would have experienced everyday hardships and hazards.

Understanding the impact of these environmental conditions on their physical development using documentary sources alone is very difficult, and this is an area where osteological analysis has much to contribute.

The most straightforward means of assessing growth in skeletal remains is by examining long bone length before the fusion of the epiphyses. The femur is the most commonly used bone for this kind of analysis as it is robust and likely to survive intact, and makes up the greatest proportion of standing height. Unfortunately, the age at which it becomes possible to assign a sex with any confidence is close to the age at which the long bone epiphyses fuse, making any sex-specific analysis of long bone growth in childhood very difficult. For this reason, femoral diaphyseal length was recorded for just 23 females aged at between 14 and 16 years in this study (Tab 1). No comparable modern data are available, as today the vast majority of girls have commenced fusion of the femoral epiphyses by the age of 14 years. However, based on this limited dataset, it does seem that long bone growth in the medieval sample was below modern standards such as those recorded by Maresh for 20th-century white children in Denver, USA.²⁶ The average femoral diaphysis length recorded for the medieval 14-year-old females (354 mm) is closest to that recorded by Maresh for 20th-century 10-year-olds (348 mm). The average figures for medieval 15 and 16-year-old females (365 mm and 366 mm respectively) are still lower than for 20th-century 11-year-olds (367 mm). These data suggest that growth in medieval England fell well below modern standards, perhaps reflecting the lower standard of living medieval children would have experienced.

Table 1: Femur diaphysis length by estimated age in medieval female skeletons

Estimated age (years)	No. of individuals	Femoral diaphyseal length (range, mm)	Mean femoral diaphyseal length (mm)
14	8	338-365	354
15	9	344-394	365
16	6	335-387	366

It does not necessarily follow that medieval women were considerably shorter than their modern counterparts. When compared to dental formation, epiphyseal fusion in the female adolescent skeletons from our sample was delayed by two to three years in comparison to modern standards, allowing them to ‘catch-up’ their growth during the pubertal growth spurt.²⁷ This pattern of extended growth appears to have been common in the medieval period; Cardoso found that, although growth before puberty was delayed in both his medieval and early 20th-century Portuguese samples, post-pubertal growth for the medieval population showed significant recovery towards modern levels.²⁸

Femoral length including fused epiphyses was recorded for 131 medieval females aged between 17 and 25 years. This can provide a means of estimating standing height using the formulae of Trotter and Gleser.²⁹ The mean stature for the females in the combined sample was 157.2 cm (5’2”) based on 131 individuals, with over half of the young women measuring between 5’1” and 5’3”. Only very slight differences in stature were noted between the women of Lincolnshire, London and Gloucester, although the London females had greater diversity in adult height. York women were notably shorter, with a mean stature of 152.9 cm (5’0”), although this is based on only 12 individuals (Fig 1). It may indicate that the young women buried in the York cemeteries, many of whom are believed to be migrant

workers from the surrounding rural hinterland,³⁰ experienced urban living conditions that were too poor to allow for final catch-up growth. For example, the average stature for females who remained in nearby rural Wharram Percy was 157.8 cm,³¹ very close to the overall average. In fact, the young medieval women from our sites are slightly shorter than the average range for medieval women when all ages groups are considered, reported to be between 159–160 cm.³² This may suggest that girls who experienced poorer conditions for childhood and adolescent growth were more likely to die around or before the age of 25 years.



Figure 1: Estimated stature of young medieval women in the study sites; boxes represent 25th to 75th percentile, with median shown as centre line, while whiskers represent outliers

It has been suggested that female height may have suffered in comparison to male height in medieval Europe due to preferential feeding and care of male children,³³ causing greater sexual dimorphism in growth and final stature between the sexes. By comparison, the average stature of young men at our sites (156 individuals) was 169.5 cm (5'7"). This may simply be the result of sexual dimorphism as such comparisons are similar for modern western populations, and therefore does not support the hypothesis that girls experienced poorer nutrition and living standards than boys.

A further way of examining adolescent growth and development is by recording the timing of specific dental and skeletal events known to occur at certain points in pubertal development. These methods, commonly used in modern paediatrics and orthodontics, have only recently been applied to archaeological remains:³⁴ examination of canine root development, epiphyseal fusion in the hand and wrist, maturation of the iliac crest,³⁵ and changes in the morphology of the cervical (neck) vertebrae.³⁶ According to these indicators, it appears that all of the individuals studied had entered the pubertal growth spurt by the age of 14 years. In the modern western world girls tend to begin puberty around the age of 10 years,³⁷ and so this result would fit with modern expectations. More information can be gained from examining the epiphyseal fusion of the hand phalanges, a process known to

occur during the deceleration phase of the pubertal growth spurt, and correlated with first menstruation in modern females. Although the age at which this event occurred varied in our sample just as among modern girls, fusion appears to have occurred most frequently between 15 and 17 years (Fig 2). At 14 years, only 36% of girls display fusing or fused hand phalangeal epiphyses, but by 17 years this figure has risen to 84%.

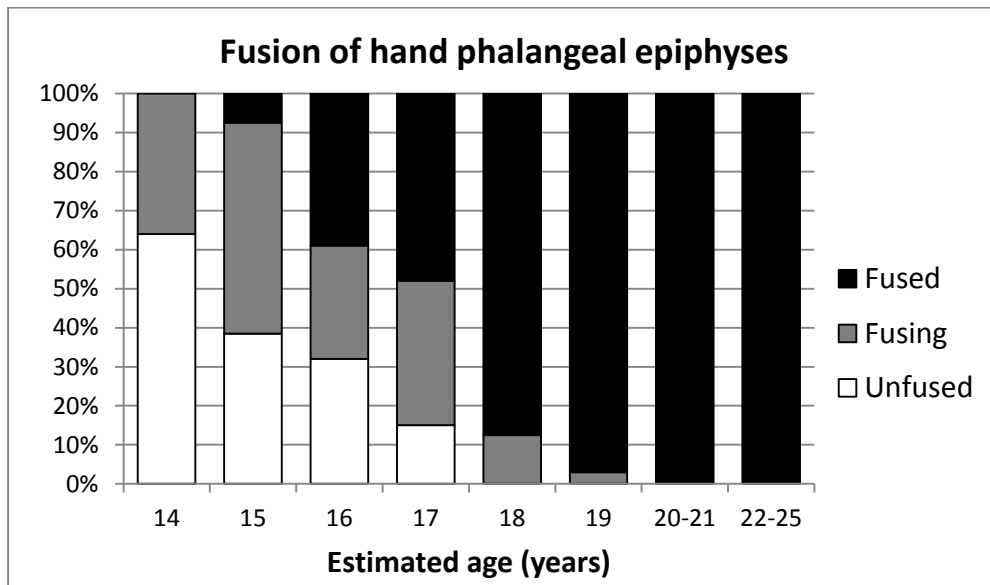


Figure 2: Epiphyseal fusion of the hand phalanges by age in the females examined (n=208).

A second skeletal event known to be associated with first menstruation, the ossification of the iliac crest of the ilium, was also only found in girls aged at 15 years or over. Interestingly, this is roughly in line with the average age at menarche suggested by the few available documentary sources.³⁸ An average age at menarche of between 15 and 16 years would be much later than the modern British average of just under 13 years.³⁹ In addition to their shorter stature, this finding adds weight to the argument that environmental factors such as a deficient diet and disease were having a negative impact on medieval female growth and development. Interestingly, however, this average age at menarche is below the age of 17 years recorded for mid-19th century females,⁴⁰ indicating that urban conditions were not as detrimental as those experienced during rapid industrialisation.

Osteological analysis can also provide information about the end of the pubertal growth spurt, and the cessation of growth by examining the fusion of the distal epiphysis of the radius in the forearm. This epiphysis begins to fuse in the final year of the growth spurt and complete fusion indicates that an individual is post-pubertal. For the majority of modern British females, this occurs between 15 and 16 years.⁴¹ The evidence for medieval England, however, shows a delay in the achievement of this milestone, which appears to have fallen between 17 and 18 years for most girls, based on 247 individuals with this bone surviving (Fig 3). Complete fusion of the iliac crest of the ilium, which signals the end of

pelvic growth, was only seen in a minority of women aged below 20 years, based on the 277 individuals (Fig 4).

These data suggest that puberty was extended into the very late teens for young medieval women, pushing back the timing of achievement of full physical adulthood. This extended period of physical adolescence indicates that living standards for young medieval women, at least in the urban and small town environments, were considerably poorer than those of modern British adolescents.

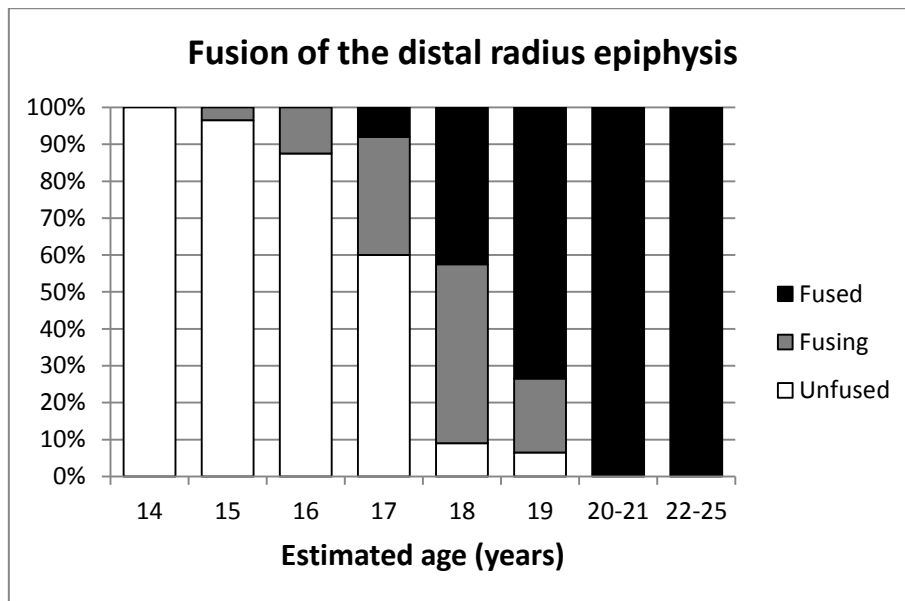


Figure 3: Distal radius fusion by age in the female skeletons examined (n=247).

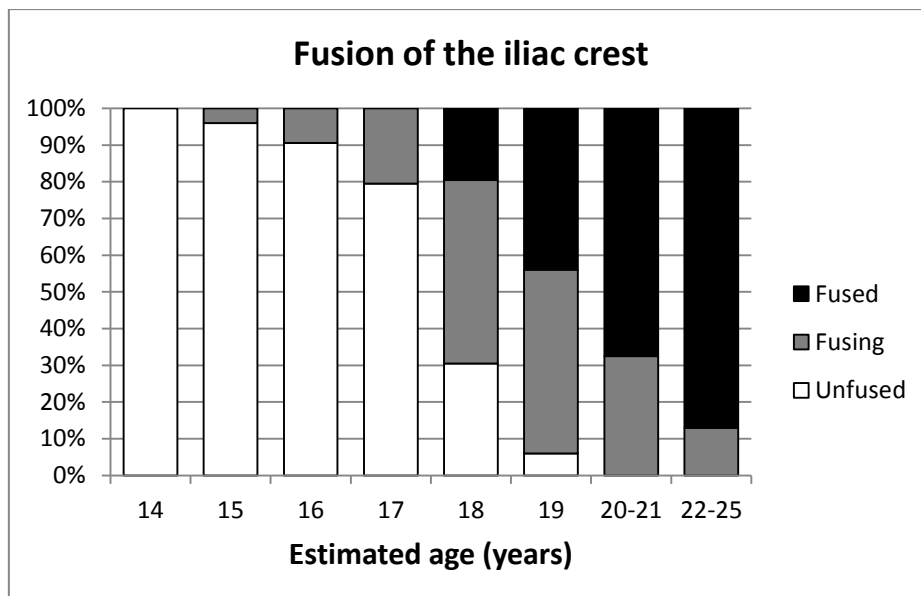


Figure 4: Iliac crest fusion by age in the female skeletons examined (n= 277)

Some variation between the sites was noted, with pubertal development most advanced in the small town of Barton-upon-Humber, and most delayed in the urban hospital cemetery

of St Mary Spital, London. This presumably reflects the harsher living conditions experienced by the girls living and working in London.

LIVING CONDITIONS, MIGRATION AND WORKING LIFE

Documentary sources indicate that it was usual for medieval girls to take up a formal service contract, casual labour or, more rarely, apprenticeships in their teenage years, usually involving a move away from their natal home.⁴² It is believed that the demographic changes caused by the Black Death may have led to increased opportunities for many women to migrate and work.⁴³

Although less documentary evidence is available for women than for men, there is evidence for female servants much younger than 12 years in urban households,⁴⁴ and some migration may have occurred at a very young age. Although legislation was passed to regulate the minimum age for apprentices — 13 years in the early 14th century, rising to 16 years by the 15th century — apprenticeships were rarely available for girls, and no such legal minimum age existed for servants or casual workers. The available evidence suggests that girls started formal work away from home at a younger age than boys.⁴⁵

The effect that this life change would have had on young women would have depended on the circumstances of their migration and the nature of the work they undertook. Migration brought with it several advantages, notably the opportunity to earn and save money, the acquisition of knowledge and skills, and a degree of personal freedom; the latter is perhaps most clearly indicated by the large number of migrant women recorded as making 'merchet' payments for the right to choose their own marriage partner.⁴⁶ On the other hand, moving away from home, particularly to a town or city, could bring with it new challenges and hazards, such as sexual predation, mistreatment, injury and disease.

Infection was an ever-present hazard in medieval England, but particularly in the crowded conditions of the urban centres. Documentary sources recall the devastation caused by the Black Death and subsequent plague outbreaks. Evidence for the impact of endemic diseases is much rarer. Osteological evidence provides a more solid foundation for a study of such diseases. Unfortunately, only chronic infections will leave a trace on the skeleton, but they can provide useful information on some of the ailments suffered by young medieval women.

Chronic maxillary sinusitis is an uncomfortable, but rarely serious, infection of the upper airways, which may result in bone formation within the sinus.⁴⁷ Although sinusitis can result as a complication of dental disease or be related to infections such as leprosy, previous studies have shown the prevalence of sinusitis is most commonly related to air pollution and an urban environment.⁴⁸ In the current sample, when dental and infectious disease was controlled for, there was a higher prevalence of sinusitis in young females compared to their male counterparts, at 25.2% (n= 36/143) compared to 9.5% (n= 15/158), a highly significant difference (chi-squared test, p = 0.007). Despite the link of chronic sinusitis to urban air pollution, rates were the lowest in London (Tab 2) and particularly high at York (46.6%). It may be that working indoors had a greater impact on the development of the condition, whereas atmospheric air pollution was less significant, and more women in York worked as domestics. The sample at York is small compared to London which may affect these results, but previous studies have shown the women of medieval York to have higher rates of the disease compared to the rural counterparts.⁴⁹

Table 2: Prevalence of maxillary sinusitis among young women at the sites studied

Site	No. of young women presenting sinuses for examination	No. displaying maxillary sinusitis
Barton-upon-Humber	34	9 (26.4%)
St Mary Spital, London	84	17 (20.2%)
St Oswald's Priory, Gloucester	10	3 (30%)
St Helen-on-the-Walls and Fishergate House, York	15	7 (46.6%)

Young medieval women also appear to have been disproportionately affected by a much more serious disease, tuberculosis. This disease may be diagnosed in skeletal remains where distinctive erosive lesions in the spine, ribs or major joints are observed.⁵⁰ The crude prevalence rate (or CPR, based on the number of individuals affected) of tuberculosis calculated for the female skeletons in the sample was 3.4% (n= 11). Nearly all of these cases were from St Mary Spital, where the CPR was 4.9% (n= 10); among young males at this site the rate was just 2.2% (n=4). Although the numbers are too small for statistical analysis, given that only 5–7% of cases of tuberculosis are thought to involve the skeleton,⁵¹ this result indicates that much greater numbers of women living and dying in London were actually suffering from tuberculosis.

Tuberculosis is known to be exacerbated by poor, overcrowded living conditions and a deficient diet, in particular a lack of vitamin D.⁵² Vitamin D is produced through exposure to ultraviolet light and to a lesser extent, through access to oily fish in the diet, lack of vitamin D results in rickets and osteomalacia.⁵³ Rickets is recognised as producing weakened bone with characteristic fraying at the ends of the ribs and long bones, with osteomalacia or healed rickets diagnosed where there is abnormal bowing, pseudofractures or other skeletal deformities.⁵⁴ The CPR for rickets in the young medieval women examined (5.1%, n=16) was higher than that for the men (3.2%, n=10). Again, the numbers are too small for statistical analysis, but this may provide further evidence for girls having a more indoor lifestyle than boys in the medieval period.

In terms of everyday tasks undertaken, there would have been clear differences between the activities of girls in rural areas and in urban areas, but it appears that the majority of women's work in either environment took place in and around the home, in domestic tasks as well as helping with the animals and kitchen garden (in rural areas) or the workshop of the urban home.⁵⁵ Most women appear to have undertaken a huge variety of different tasks during the working day, from cleaning and washing, collecting water and cooking, to baking and brewing, spinning and weaving, as well as looking after children, while men were generally able to focus on one main profession.⁵⁶ There can be little doubt that this extensive workload was exhausting for many women, but osteological study can provide further direct evidence for the impact that this had on young women's bodies.

A wide range of trauma has been recorded on the skeletons of young medieval women, including fractures of the upper limb and finger bones, cranium and ribs, lower limbs and feet.⁵⁷ However, the prevalence of fractures of each type is lower than among males, suggesting that girls were exposed to (or exposed themselves to) fewer risks of injury than boys. It is notable that of the 48 cases of trauma reported in the grey and published literature, cranial, rib and jaw injuries, suggestive of interpersonal violence, only started to appear in women aged 17–25 years, comprising 18.6% of the 43 fractures for this age group.

This suggests that the risk of violence rose as girls turned into young women, perhaps reflecting domestic violence after marriage.⁵⁸

There is one area of the skeleton where young women seem to have suffered virtually the same frequency of fractures as young men, the vertebral column. By far the highest prevalence rate for vertebral fractures (4.7%, n=9) was found at St Mary Spital (Tab 3), suggesting that it female workers in the capital, or at least the poor workers buried in this hospital cemetery, were undertaking the activities most likely to cause spinal injury. The majority of these fractures were compression fractures, often caused by falls from a height, although avulsion and hyperflexion injuries were also present.⁵⁹

Schmorl's nodes are common, often asymptomatic, depressions caused by herniation of the nucleus pulposus on the superior and inferior surfaces of the vertebral bodies. Their aetiology is complex, although spinal trauma caused by vigorous activity and flexion and extension of the spine is most commonly associated with their formation.⁶⁰ The age of their occurrence is not clear, but they generally appear before the age of 18 years.⁶¹ Plomp et al argued that males are more susceptible to these lesions due to the size and shape of their vertebrae.⁶² In our study, medieval women had a higher prevalence of the lesions (Tab 3). Analysis of the location of by Schmorl's nodes on the vertebrae revealed that the lumbar vertebrae were affected far more often among women, and the central thoracic vertebrae among men. This mirrors vertebral fractures where in the women all of the fractures occurred in the lower thoracic and lumbar vertebrae, while in young men the central thoracic vertebrae were affected. This may suggest different activities; strain on the lumbar vertebrae, in particular, may be caused by bending and lifting.⁶³

Table 3: Crude percentage prevalence rates for vertebral pathology among young medieval women (male rates in brackets)

	St Mary Spital	Barton-upon-Humber	York	All sites
Vertebral fractures	4.7 (4.4)	0 (0)	2.6 (0)	3.9 (3.4)
Schmorl's nodes	33.3 (45)	16.2 (25.7)	32.3 (40.4)	29.8 (40.3)
Spondylolysis	4.8 (2.9)	3.0 (0)	3.2 (2.1)	4.4 (2.2)

Further evidence for stress being placed on the spines of young medieval women is provided by cases of spondylolysis. This describes the partial separation of the inferior facets on the neural arch from the vertebral body, usually between the ages of 10–12 years. The condition results from microtrauma in low grade stress on the lower back due to bending and lifting strains, or a fall from a height,⁶⁴ but may have an underlying congenital cause. This injury was present in 4.4% of the female skeletons examined (Tab 3). This is higher than the prevalence of this condition found by the authors among young medieval males (2.9%), although the numbers involved were too small for statistical analysis. Again, the area involved is the lumbar region of the vertebral column. In addition, three young women, two aged at around 21 years and one at 22–25 years, display early degenerative joint disease of the vertebral column.

What emerges from the osteological evidence is that the workload of many young medieval women appears to have been literally backbreaking, and these early injuries may be expected to have led to significant back problems and pain in later life. It seems likely that these early spinal problems were caused primarily by carrying heavy loads at a time

when the spine was still forming and vulnerable. Research from the grey and published literature reveals that rates of spinal injury were higher in urban than rural women⁶⁵ and suggests that the workload of the young migrant women in service was harder than that of the young women who remained in the country or in small towns with their families. For example, the prevalence of vertebral fractures, spondylolysis and Schmorl's nodes was lowest at Barton-upon-Humber, a wealthy small town.⁶⁶

MARRIAGE, SEXUAL ACTIVITY AND CHILDBIRTH

There is considerable evidence to suggest that marriage was a defining moment in the medieval female life course, marking the transition into true social adulthood.⁶⁷ It is notable, however, that there was a significant gap between the legal age at marriage (12 years) and the average age at marriage (20–25 years even before the Black Death) in medieval England.⁶⁸ The new analysis of pubertal development in medieval England discussed above suggests that the average age at menarche was 15–16 years. Full fertility, in terms of the likelihood of conception, carrying a healthy pregnancy to term and surviving childbirth, would only have followed several years after menarche with the completion of pelvic growth,⁶⁹ which in our medieval sample appears to have been rare before the age of 19 years. The fact that many young medieval women would not have been fertile before their twenties may be one reason for the relatively late average age of marriage during this period.⁷⁰ It also suggests that marriage at the legal minimum age of 12 years would rarely have been fruitful, and any pregnancy that did ensue would have carried significant risks for the mother. We know of several medieval legal cases of the marriage of young girls where the 'physical readiness for marriage' of the girl in question was debated.⁷¹ There is evidence to suggest, however, that the majority of cases of marriage before 15 years were confined to the nobility.⁷² Today, girls of higher socio-economic status, with a considerably better standard of life, mature earlier than average. For example, high caste girls in 20th-century India have an average age at menarche over a year younger than low caste girls.⁷³ The average age at menarche for noble girls in medieval England may therefore have been younger than the average age of 15–16 years described above. Even so, a pregnancy before the completion of pelvic development would have been dangerous; a famous example of this is provided by Margaret Beaufort, who appears to have been rendered sterile by a difficult first birth (of the future king Henry VII) at the age of just 13 years.⁷⁴ An understanding of these risks is demonstrated by several contemporary authors,⁷⁵ and was reflected in the Jewish rule that contraception (banned by Christian teaching) could be used to prevent pregnancy if the bride were too young to safely bear a child.⁷⁶

In theory, marriage coincided with sexual initiation for young women, and if the Church's remonstrations to remain celibate until marriage were universally followed, it would indicate a relatively late age of sexual initiation. In reality, premarital sex among betrothed couples seems to have been common,⁷⁷ and sex with other partners, in not all cases consensual, was far from rare. Evidence for this is provided by the erratic enforcement of 'legerwite' or 'leyrwite' fines on serf women who engaged in premarital sex.⁷⁸ Premarital sex is thought to have been particularly common among young girls and women living away from home, for example in service roles, due to the greater freedom and availability of partners as well as the risk of sexual predation or pimping from employers.⁷⁹ The sexual exploitation of girls in service appears to have been a frequent problem based on the legal record,⁸⁰ and many young women must have lost their virginity in these circumstances. The extensive focus of many writers on admonishing young women to stay celibate until

marriage may be taken as further evidence that premarital sex was seen (at least for women) as a significant societal problem.

Two aspects of osteological analysis may shed light on sexual activity among young medieval women. The first is a sexually transmitted disease. Venereal syphilis, a treponemal disease, affects the skeleton in its tertiary stage, causing distinctive skeletal lesions.⁸¹ From the end of the 15th century, syphilis is believed to have been endemic in urban areas of England, although recent work has suggested that it may have been present at a much earlier date.⁸²

Among the 14-25 year old female individuals examined, four probable cases of treponemal disease were recorded, based on the presence of characteristic gummatous lesions in the cranium or long bones.⁸³ Three of these were found in the young women from London, and one was found in York, at St Helen-on-the-Walls. One further case is known from Blackfriars, Gloucester;⁸⁴ no cases were identified in the rural or small town sites consulted in the wider survey. The two youngest women to show signs of treponemal disease were aged at just 16 years. It is difficult to rule out congenital syphilis in these cases, as the presentation of the two conditions can be very similar, although none of these skeletons display the typical dental deformations of congenital syphilis. If the disease is the venereal form of treponemal disease, or syphilis, this would suggest the girls were very young when first infected. Syphilis generally takes several years to cause such destruction in the skeleton.⁸⁵ Although the number of cases recorded is small, given that only 10–20% of individuals with tertiary syphilis experience skeletal involvement and that skeletal lesions take several years to develop,⁸⁶ it seems likely that much greater numbers of young women were affected by this disease.

The spread of sexually transmitted diseases such as syphilis was exacerbated by the problem of prostitution in medieval towns and cities. Karras argues that regulations of the Guilds limited women's access to the normal labour market, forcing them to turn to prostitution out of necessity.⁸⁷ There is little direct evidence that apprentices were procured as prostitutes, but one extant record from London City and Ecclesiastical Court (AD 1423) attests that one Alison Boston took apprentices who she hired out for the 'horrible vice of lechery'.⁸⁸ There are also accounts of men taking young girls (*invenculae*) to the London stews and selling them as prostitutes, suggesting the types of danger faced by young unskilled immigrant women. Goldberg⁸⁹ cites the famous references from medieval York in AD 1482 that place prostitutes within the legal realm of 'lepers' and pigs in the hazards they caused for the local population. She does not discuss the age at which women may have turned to prostitution, but suggests widows and daughters of labourers, known as 'spinsters' and 'seamstresses' (*sempsters*), needed to work several jobs to make ends meet, including petty theft, illegal ale retailing and prostitution. Goldberg argues that although fulltime, 'professional' prostitutes were rare, many women were forced into occasional prostitution in hard times.⁹⁰ This would have been a particular risk for a migrant girl away from the safety of her family.⁹¹ Although it is impossible to state that any of the young medieval women examined were forced into this profession, this must be considered in the cases where possible syphilis is recorded.

A second consequence of sexual activity, pregnancy, may also in exceptional circumstances be visible in the archaeological record. In total, eight cases of young women buried with fetuses *in utero* have been recorded from medieval cemetery contexts. These burials represent 'obstetric catastrophes' with the death of both mother and child in late pregnancy or childbirth. Although there was a Christian injunction in place in medieval

England for infants to be removed from their mother's womb before burial,⁹² this does not appear to have been rigorously obeyed.

All of the individuals buried with a fetus *in utero* in medieval cemeteries have an estimated age at death of around 20 years or over, and thus none represent particularly young 'teenage' pregnancies. This may support the idea that in the medieval period teenage girls were not falling pregnant, as first pregnancies are often seen as the most hazardous.⁹³ It also fits with the known late pattern of marriage in this society. However, it is by no means certain that all of these women were married. The two examples from St Mary Spital may have represented extramarital pregnancies as the hospital was known to accept unmarried women in pregnancy or childbirth.⁹⁴ It may be significant that neither of these women received an individual grave or any grave ornamentation. In contrast, the elaborate nature of one young mother's burial at Barton-upon-Humber, in a coffin within the church and with a cloth of gold artefact,⁹⁵ surely indicates that this woman was married and held a position of substantial social standing.

Given the high mortality rate of women in childbirth in the medieval period revealed by documentary sources,⁹⁶ it is clear that these rare burials represent a dramatic under-estimation of the real levels of maternal mortality. In many cases, the churches prohibition on burying fetuses *in utero* may have been observed. In a large proportion of births, too, the child may have been saved, leaving little clue as to the cause of death of the mother.

CONCLUSION

The period of social adolescence for young medieval women seems to have been an important life stage, encompassing the growth to full physical adulthood and fertility, the adoption of adult working roles and, for most young women, the move from legal dependence on a father to legal dependence on a husband, with perhaps a few brief years of relative independence in between. The comparative absence of young women from documentary sources means that osteological information plays a vital role in our understanding of this group, and it can reveal a great deal about the way in which medieval girls grew into women, the living conditions they enjoyed or endured, the work they did and the health problems they faced.

Many of the conclusions drawn from osteological analysis of this group articulate with and illuminate the documentary evidence. The average age at which full fertility appears to have been achieved, around 20 years, is substantially later than in modern England, but ties in well with the known average age at marriage in this society. The greater susceptibility of young women to respiratory infections, from the relatively benign maxillary sinusitis to the deadly serious tuberculosis, chimes with the picture drawn from documentary sources of an indoor lifestyle for women, close to the smoky fire, and of the cramped living conditions that helped to spread disease. The backbreaking work clearly undertaken by many young women paints a clearer physical picture of their daily lives than that provided by documentary sources alone, and the development of signs of venereal disease in very young women hints at the problem of girls being driven to prostitution in England's medieval cities.

ACKNOWLEDGEMENTS

This project was funded by a Leverhulme Trust Large Grant for the 'Medieval Adolescence, Migration and Health' Project (2011–2014). We are grateful to many people for allowing us access to the skeletal material they curate: Rebecca Redfern, Jelena Bekvalac (Museum of

London), Charlotte Roberts, Rebecca Gowland (Durham University), Christine McDonnell (YAT), Kevin Booth and Simon Mays (English Heritage).

BIBLIOGRAPHY

- Aks glaede, L, Olsen, L W, Sørensen, T et al 2008, 'Forty years trends in timing of pubertal growth spurt in 157,000 Danish school children', *PLoS One* **3**, 2728.
- Aufderheide, A C and Rodriguez-Martín, C 1998, *The Cambridge Encyclopedia of Paleopathology*, Cambridge: Cambridge University Press.
- Bagga, A and Kulkarni, S 2000, 'Age at menarche and secular trend in Maharashtrian (Indian) girls', *Acta Biol Szeged* **44**, 53–7.
- Bass, W 1995, *Human Osteology: A Laboratory and Field Manual*, Springfield: Missouri Archaeological Society.
- Bennett, J 1987, *Women in the Medieval English Countryside: Gender and Household in Brigstock before the Plague*, Oxford: Oxford University Press.
- Bogin, B 1999, *Patterns of Human Growth*, Cambridge: Cambridge University Press.
- Boocock, P, Roberts, C and Manchester, K 1995, 'Maxillary sinusitis in medieval Chichester, England', *Am J Phys Anthropol* **98**, 483–95.
- Brickley M, and Ives R, 2008, *The Bioarchaeology of Metabolic Bone Disease*, Oxford: Academic Press.
- Brickley M, Mays S, and Ives R, 2005, 'Skeletal manifestations of vitamin D deficiency osteomalacia in documented historical collections', *Int J Osteoarchaeol* **15**, 389–403.
- Butler S, 2006, 'Runaway wives, husband desertion in medieval England', *J Soc Hist* **40**: 2, 337–59.
- Cardoso, H 2009, Patterns of growth and development of the human skeleton and dentition in relation to environmental quality (unpubl PhD thesis, McMaster University, Hamilton, Ontario, Canada).
- Cardoso H, Heuze Y and Julio P 2010, 'Secular changes in the timing of dental root maturation in Portuguese boys and girls', *Am J Hum Biol* **22**, 791–800.
- Cole G, and Waldron T 2011, 'Apple Down 152: a putative case of syphilis from sixth-century AD Anglo-Saxon England', *Am J Phys Anth* **144**, 72–9.
- Connell, B, Gray Jones, A, Redfern, R and Walker, D 2012, *A Bioarchaeological Study of Medieval Burials on the Site of St Mary Spital*, London: Museum of London Archaeology.
- Dar, G , Masharawi, Y , Peleg, S, Steinberg, N, May, H, Medlej, B, Peled, N and HersHKovitz, I 2010, 'Schmorl's nodes distribution in the human spine and its possible etiology', *Eur Spine J* **19**, 670–5.
- Dawes, J D and Magilton, J R 1980, *The Cemetery of St Helen-on-the-Walls, Aldwark*, York: York Archaeological Trust.
- De Moor, T and Van Zanden, J L 2010, 'Girl power: the European marriage pattern and labour markets in the North Sea region in the late medieval and early modern period', *Econ Hist Rev* **63**, 1–33.
- Dolan, P, Earley M and Adams, M A 1994, 'Bending and compressive stresses acting on the lumbar spine during lifting activities', *J Biomech* **27**, 1237–48
- Gilchrist, R 2012, *Medieval Life: Archaeology and the Life Course*, Woodbridge: Boydell Press.

- Gilchrist, R and Sloane, B 2005, *Requiem: The Medieval Monastic Cemetery in Britain*, London: Museum of London Archaeology Service.
- Goldberg, P J P 1992, *Women, Work, and Life Cycle in a Medieval Economy: Women in York and Yorkshire c 1300–1520*, Oxford: Oxford University Press
- Goldberg, P J P 1999, 'Pigs and prostitutes: streetwalking in comparative perspective', in K J Lewis, N J Menuge and K M Philips (eds), *Young Medieval Women*, Stroud: Sutton, 172–93.
- Goldberg, P J P 2004, *Medieval England: A Social History, 1250–1550*, London: Hodder Arnold.
- Hägg, U and Taranger, J 1982, 'Maturation indicators and the pubertal growth spurt', *Am J Orthod* **82**, 299–309.
- Hanawalt, B 1992, 'Historical descriptions and prescriptions for adolescence', *J Fam Hist* **17**, 341–51.
- Hanawalt, B 1993, *Growing Up in Medieval London*, Oxford: Oxford University Press.
- Heighway, C and Bryant, R 1999, *The Golden Minster. The Anglo-Saxon Minster and Later Medieval Priory of St Oswald at Gloucester*, York: Council for British Archaeology.
- Holst, M 2003, Osteological Analysis: Fishergate House, North Yorkshire, York: Field Archaeology Specialists (unpubl osteology rep).
- James, E 2004, 'Childhood and youth in the early Middle Ages', in P J P Goldberg and F Riddy (eds), *Youth in the Middle Ages*, York: York Medieval Press, 11–24.
- Jewell, H M 1996, *Women in Medieval England*, Manchester: Manchester University Press.
- Jewell, H M 2007, *Women in Dark Age and Early Medieval Europe*, Basingstoke: Palgrave Macmillan.
- Kaplowitz, P 2006, 'Pubertal development in girls: secular trends', *Curr Opin Obstet Gynecol* **18**, 487–91.
- Karras, R 1996, *Common Women: Prostitution and Sexuality in Medieval England*, Oxford: Oxford University Press.
- Karras, R 2005, *Sexuality in Medieval Europe: Doing Unto Others*, London: Routledge.
- Kyere, K, Than, K, Wang, A, Rahman, S, Valdivia-Valdivia, J, Lamarca, F and Park, P 2012, 'Schmorl's nodes', *Eur Spine J* **21**:11, 2115–21.
- Lewis, M E, Roberts, C A and Manchester, K 1995, 'Comparative study of the prevalence of maxillary sinusitis in later medieval urban and rural populations in northern England', *Am J Phys Anthropol* **98**, 497–506.
- Maresh, M 1970, 'Measurements from roentgenograms, heart size, long bone lengths, bone, muscles and fat widths, skeletal maturation', in R W McCammon (ed), *Human Growth and Development*, Springfield: Charles C Thomas, 155–200.
- Mays, S 2010, *The Archaeology of Human Bones*, London: Routledge.
- Mays, S, Crane-Kramer, G and Bayliss, A 2003, 'Two probable cases of treponemal disease of medieval date from England', *Am J Phys Anthropol* **120**, 133–43.
- Mayor, S 2004, 'Pregnancy and childbirth are leading causes of death in teenage girls in developing countries', *Brit Med J* **328**, 1152.
- Norton, E 2011, *Margaret Beaufort: Mother of the Tudor Dynasty*, Stroud: Amberley Publishing.
- Ortner, D 2003, *Identification of Pathological Conditions in Human Skeletal Remains*, 2nd edn, New York: Academic Press.
- Philips, K M 2003, *Medieval Maidens: Young Women and Gender in England, 1270–1540*, Manchester: Manchester University Press.

- Plomp, K, Roberts, C, and Strand Vidarsdottir, U 2012, 'Vertebral morphology influences the development of Schmorl's nodes in the lower thoracic vertebrae', *Am J Phys Anthropol* **149**:4, 572–82.
- Rawcliffe, C 2013, *Urban Bodies: Communal Health in Late Medieval English Towns and Cities*, Woodbridge: Boydell Press.
- Resnick, D (ed) 1995, *Diagnosis of Bone and Joint Disorders*, 3rd edn, Philadelphia: W.B. Saunders Company.
- Roberts, C A 1994, 'Treponematosis in Gloucester, England: a theoretical and practical approach to the pre-Columbian theory', in O Dutour, G Pálfi, J Bérator et al (eds), *L'origine de la Syphilis en Europe, Avant ou Après 1493?*, Toulon: Centre Archéologique du Var, 101–8.
- Roberts, C 2007, 'A bioarchaeological study of maxillary sinusitis', *Am J Phys Anthropol* **133**:2, 792–807.
- Roberts, C A and Buikstra, J 2003, *The Bioarchaeology of Tuberculosis: A Global View on a Re-emerging Disease*, Gainesville: University Press of Florida.
- Roberts, C A and Cox, M 2003, *Health and Disease in Britain: from Prehistory to the Present Day*, Stroud: Sutton.
- Rodwell, W 2011, *St Peter's, Barton-upon-Humber, Lincolnshire: A Parish Church and its Community. Vol 1: History, Archaeology and Architecture*, Oxford: Oxbow.
- Rosenthal, J T 2010, *Margaret Paston's Piety*, Basingstoke: Palgrave MacMillan.
- Schultz, J A 1991, 'Medieval adolescence: the claims of history and the silence of German narrative', *Speculum* **66**, 519–39.
- Shapland, F and Lewis, M E 2013a, 'Brief communication: a proposed osteological method for the estimation of pubertal stage in human skeletal remains', *Am J Phys Anthropol* **151**, 302–10.
- Shapland, F and Lewis, M E 2013b, 'Brief communication: a proposed method for the assessment of pubertal stage in human skeletal remains using cervical vertebrae maturation', *Am J Phys Anthropol* **153**, 144–53.
- Smith, B H 1991, 'Standards of human tooth formation and dental age assessment', in M A Kelley and C S Larsen (eds), *Advances in Dental Anthropology*, New York: Wiley-Liss, 143–68.
- Tanner, J M 1981, 'Catch-up growth in man', *Brit Med Bull* **37**:3, 233–8.
- Trotter, M and Gleser, G C 1958, 'A re-evaluation of estimation of stature based on measurements of stature taken during life and of long bones after death', *Am J Phys Anthropol* **16**, 79–123.
- von Hunnius T E, Roberts C A, Boylston, A and Saunders, S R 2006, 'Histological identification of syphilis in pre-Columbian England', *Am J Phys Anthropol* **129**, 559–66.
- Waldron, T 2009, *St Peter's, Barton-upon-Humber, Lincolnshire: A Parish Church and its Community. Vol 2: The Human Remains*, Oxford: Oxbow.
- Whincup P H, Gilg J A, Odoki K, Taylor, S and Cook, D 2001, 'Age of menarche in contemporary British teenagers: survey of girls born between 1982 and 1986', *Brit Med J* **322**, 1095–6.

¹ Department of Archaeology, Whiteknights Box 227, Reading, RG6 6AB, England, United Kingdom. *f.c.shapland@reading.ac.uk*

² Department of Archaeology, Whiteknights Box 227, Reading, RG6 6AB, England, United Kingdom. *m.e.lewis@reading.ac.uk*

³ Department of Archaeology, Whiteknights Box 227, Reading, RG6 6AB, England, United Kingdom. *r.b.watts@reading.ac.uk*

⁴ Eg Schultz 1991; Hanawalt 1992.

⁵ Goldberg 1992.

⁶ Norton 2011.

⁷ Rosenthal 2010.

⁸ Rodwell 2011; Waldron 2009.

⁹ Connell et al 2012.

¹⁰ Heighway and Bryant 1999.

¹¹ Holst 2003; Dawes and Magilton 1980.

¹² The most reliable means of estimating age-at-death in child skeletal remains is by examining dental development (Smith 1991). Although recent work has highlighted a slight acceleration in dental development over the last fifty years in western countries due to improvements in health and nutrition (Cardoso et al 2010), dental development is less significantly influenced by environmental factors than skeletal development or growth in stature, and so forms our most reliable means of assessing non-adult age in the past. After the completion of dental development at around 19 years in modern populations, age estimation relies on the more variable process of skeletal development.

¹³ Bass 1995, 192.

¹⁴ James 2004, 14.

¹⁵ Ibid, 13.

¹⁶ Hanawalt 1993, 10, 111.

¹⁷ Philips 2003, 4.

¹⁸ Hanawalt 1993, 179.

¹⁹ Goldberg 2004, 47.

²⁰ Hanawalt 1993, 113, 174.

²¹ Philips 2003, 4.

²² Bennett 1987, 71.

²³ Goldberg 1992, 358.

²⁴ Karras 2005, 59.

²⁵ Rawcliffe 2013.

²⁶ Maresh 1970.

²⁷ Tanner 1981.

²⁸ Cardoso 2009.

²⁹ Trotter and Gleser 1958.

³⁰ Dawes and Magilton 1980.

³¹ Mays 2010, 137.

³² Holst 2003; Roberts and Cox 2003, 248.

³³ Jewell 2007, 60.

³⁴ Shapland and Lewis 2013a, 2013b.

³⁵ Shapland and Lewis 2013a.

³⁶ Shapland and Lewis 2013b.

-
- ³⁷ Aksglaede et al 2008.
- ³⁸ Gilchrist 2012, 42.
- ³⁹ Whincup et al 2001.
- ⁴⁰ Kaplowitz 2006.
- ⁴¹ Hägg and Taranger 1982.
- ⁴² Goldberg 2004, 88–9; De Moor and Van Zanden 2010.
- ⁴³ Goldberg 1992, 342–2, 358.
- ⁴⁴ Jewell 1996, 102.
- ⁴⁵ Hanawalt 1993, 113–14.
- ⁴⁶ Bennett 1987, 72.
- ⁴⁷ Boocock et al 1995.
- ⁴⁸ Roberts 2007.
- ⁴⁹ Lewis et al 1995.
- ⁵⁰ Aufderheide and Rodriguez-Martín 1998.
- ⁵¹ Roberts and Buikstra 2003.
- ⁵² *Ibid*, 54.
- ⁵³ Brickley and Ives 2008.
- ⁵⁴ Brickey et al 2005.
- ⁵⁵ Jewell 1996, 70, 100.
- ⁵⁶ *Ibid*, 70.
- ⁵⁷ Lewis 2014, pers. comm.
- ⁵⁸ Butler 2006.
- ⁵⁹ Connell et al 2012, 98.
- ⁶⁰ Dar et al 2010; Kyere et al 2012.
- ⁶¹ Resnick, 1995.
- ⁶² Plomp et al 2012.
- ⁶³ Dolan et al 1994.
- ⁶⁴ Waldron, 2009.
- ⁶⁵ Lewis 2014, pers. comm.
- ⁶⁶ Rodwell 2011.
- ⁶⁷ Philips 2003, 4.
- ⁶⁸ Bennett 1987, 71.
- ⁶⁹ Bogin 1999, 212.
- ⁷⁰ Gilchrist 2012, 42.
- ⁷¹ Philips 2003, 26.
- ⁷² Goldberg 2004, 123
- ⁷³ Bagga and Kulkarni 2000
- ⁷⁴ Norton 2011, 42.
- ⁷⁵ Philips 2003, 26.
- ⁷⁶ Karras 2005, 74.
- ⁷⁷ *Ibid*, 97.
- ⁷⁸ *Ibid*, 96.
- ⁷⁹ *Ibid*, 98; Hanawalt 1993, 123.
- ⁸⁰ Goldberg 1992.
- ⁸¹ Ortner 2003.
- ⁸² Mays et al 2003; von Hunnius et al 2006; Cole and Waldron 2011.

-
- ⁸³ Ortner 2003.
⁸⁴ Roberts 1994.
⁸⁵ Ortner 2003.
⁸⁶ Aufderheide and Rodriguez-Martín 1998.
⁸⁷ Karras 1996.
⁸⁸ Ibid, 400.
⁸⁹ Goldberg 1999.
⁹⁰ Goldberg 1992.
⁹¹ Hanawalt 1993, 123.
⁹² Gilchrist and Sloane 2005, 72.
⁹³ Mayor 2004.
⁹⁴ Connell et al 2012.
⁹⁵ Rodwell 2011.
⁹⁶ Gilchrist 2012, 138.