Osteological Analysis
St Andrew's
Corbridge
Northumberland

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Prepared for

Alan Williams Archaeology
53 Derwentdale Gardens
High Heaton
Newcastle upon Tyne
NE7 7QN

Prepared by

Malin Holst
York Osteoarchaeology Ltd
Ivy Cottage
75 Main Street
Bishop Wilton
York YO42 1SR

Reviewed by Niki Gilding

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Summary

York Osteoarchaeology Ltd was commissioned by Alan Williams Archaeology to carry out the osteological analysis of nine partial skeletons, and several disarticulated human bone assemblages in February 2006. The skeletal remains were recovered during an archaeological watching brief in May 2005 at St Andrew's Church, Corbridge, Northumberland (NGR NY 9883 6445).

The skeletons were buried in a typical Christian manner. They had not been interred in coffins, but were probably laid to rest in simple shrouds. Residual pottery suggested that this part of the cemetery was medieval and dated to the 13th to 15th centuries.

Osteological analysis revealed that the skeletons represented a mixed group, including six children, aged between six months and six years. The six adults were all middle-aged or mature and included two females and three males.

It is likely that the children succumbed to problems related to weaning, childhood diseases or malnutrition. Those who survived early childhood tended to live to middle age. Osteological analysis of the adult skeletons suggested that these individuals were subject to arduous physical labour. They showed evidence for fractures, muscular trauma, degenerative joint disease, inflammation of the shins and load-bearing strain to the spines. The dental health of the population was generally good, with moderate dental plaque, few cavities and dental abscesses.

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1.0 INTRODUCTION

In February 2006 York Osteoarchaeology Ltd was commissioned by Alan Williams Archaeology to carry out the osteological analysis of nine partial skeletons and a number of disarticulated human bone assemblages. The skeletal remains had been excavated in May 2005 during an archaeological watching brief at St Andrew's Church, Corbridge, Northumberland (NGR NY 9883 6445) in advance of the construction of a toilet block.

St Andrew's Church in Corbridge is on of the most important Saxon structures in Northumberland and may have been part of an ecclesiastical complex (A. Williams *pers. comm.* 2006.). The church was extensively rebuilt in the 13th century.

The skeletons were buried in supine and extended positions with their feet to the east and the heads to the west, in the typical Christian manner. However, many of the burials were intercutting and as a result, the majority of skeletons were only partially preserved. This is probably also the reason for the large number of disarticulated bones and an ossuary that were encountered during the watching brief. No evidence for coffins was found and it is probable that the skeletons were buried in shrouds. Stone slabs lay beneath the left leg of Skeleton 2 and under the feet of Skeleton 4. Residual pottery suggests that the burials are medieval, dating to the 13th to 15th centuries AD.

A number of animal bone fragments were found amongst the skeletal remains (with Skeletons 2 and 6) and are thought to have been residual.

1.1 AIMS AND OBJECTIVES

The aim of the skeletal analysis was to determine the age, sex and stature of the skeletons, as well as to record and diagnose any skeletal manifestations of disease and trauma. It was aimed to calculate the minimum number of individuals buried at the site from the inhumed and disarticulated remains.

1.2 METHODOLOGY

The skeletons and disarticulated remains were analysed in detail, assessing the preservation and completeness, calculating the minimum number of individuals present as well as determining the age, sex and stature of the individuals (Appendix A). All pathological lesions were recorded and described.

2.0 OSTEOLOGICAL ANALYSIS

Osteological analysis is concerned with the determination of the identity of a skeleton, by estimating its age, sex and stature. Robusticity and non-metric traits can provide further information on the appearance and familial affinities of the individual studied. This information is essential in order to determine the prevalence of disease types and age-related changes. It is crucial for identifying gender dimorphism in occupation, lifestyle and diet, as well as the role of different age groups in society.

2.1 PRESERVATION

Skeletal preservation depends upon a number of factors, including the age and sex of the individual as well as the size, shape and robusticity of the bone. Burial environment, post-depositional disturbance and treatment following excavation can also have a considerable impact on bone condition. Preservation of human skeletal remains is assessed subjectively, depending upon the severity of bone surface erosion and post-mortem breaks, but disregarding completeness.

Preservation was assessed using a grading system of five categories: very poor, poor, moderate, good and excellent. Excellent preservation implied no bone surface erosion and very few or no breaks, whereas very poor preservation indicated complete or almost complete loss of the bone surface due to erosion and severe fragmentation.

The condition of the skeletons was variable. Four of the skeletons (44%) were well-preserved (Table 2). They had suffered from few post-mortem breaks and little surface erosion. Another four skeletons (44%) were in a moderate condition, with moderate surface erosion and bone fragmentation. A single skeleton was in a poor condition (12%); the bones had suffered from considerable erosion and fragmentation. In the majority of cases, truncation by later skeletons may have contributed to the deterioration of the skeletons.

Table 1 Summary of osteological and palaeopathological results

Skeleton No	Preservation	Completeness	Age	Sex	Stature	Pathology
1	Good	4%	18+	-	-	-
2	Moderate	95%	46+	Male	173.15	Fracture of right clavicle, left ulna head and 2nd right rib, DJD in spine, hips, left ulna, thumbs, Schmorl's nodes, arachnoid granulations, periosteal inflammatory lesions on tibiae, bone excavations, *enthesopathies*
3	Good	10%	26-35	Male	-	Spinal DJD, DJD in ribs, Scheuermann's, Schmorl's nodes, fractured clavicle
4	Good	80%	26-35	Female	155.49	Slight spinal DJD, periosteal inflammatory lesions on right tibia, *spondylolysis* of L5, bone excavations
5	Moderate	20%	12 months	-	-	-
6	Poor	15%	6-9 months	-	-	-
7	Moderate	15%	18+	Male?	-	DJD of right knee, *enthesopathies*
8	Good	10%	18+	-	-	-
9	Moderate	8%	4-6	-	-	-

The completeness of the skeletons also varied considerably, with the skeletons being between 4% and 95% complete (see Table 1). The absence of some bones from all the skeletons can also be attributed to intercutting of burials, so typical of Christian churchyards.

The disarticulated remains were generally well-preserved, but often broken. The assemblage consisted mostly of long bone and skull fragments, as well as occasional axial bones (Appendix A).

2.2 MINIMUM NUMBER OF INDIVIDUALS

A count of the 'minimum number of individuals' (MNI) recovered from a cemetery is carried out as standard procedure in osteological reports on inhumations in order to establish how many individuals are represented by the articulated and disarticulated human bones (without taking the archaeologically defined graves into account). The MNI is calculated by counting all long bone ends, as well as other larger skeletal elements recovered. The largest number of these is then taken as the MNI. The MNI is likely to be lower than the actual number of skeletons which would have been interred on the site, but represents the minimum number of individuals which can be scientifically proven to be present.

Using the inhumation burials and disarticulated bone to calculate the MNI, it was found that at least twelve individuals were represented. A MNI of six adults, including three adult males (one young middle adult, an old middle adult and a mature adult) and two adult females (a young middle adult and a mature adult), as well as three juveniles and three infants were present at the site.

2.3 ASSESSMENT OF AGE

Age was determined using standard ageing techniques, as specified in Scheuer and Black (2000a; 2000b) and Cox (2000). Age estimation relies on the presence of the pelvis and uses different stages of bone development and degeneration in order to calculate the age of an individual. Age is split into a number of categories, from foetus (up to 40 weeks in *utero*), neonate (around the time of birth), infant (newborn to one year), juvenile (1-12 years), adolescent (13-17 years), young adult (ya; 18-25 years), young middle adult (yma; 26-35 years), old middle adult (oma; 36-45 years), mature adult (ma; 46+) to adult (an individual whose age could not be determined more accurately as over the age of seventeen).

In this instance, the majority of ageing characteristics had not survived. In one case, the age estimation had to rely on the dental wear alone (Skeleton 3), which is frequently unreliable, as the grittiness of the diet consumed affects dental wear and therefore the ageing assessment. This male was aged between 26 and 35 years. In three cases (Skeletons 1, 7 and 8), age assessment was based solely on long bone joint fusion, which could only suggest that the individuals were aged eighteen years or older. The surviving ageing criteria suggested that Skeleton 2, a male, was aged 46 years or older and a female was a young middle adult (Skeleton 4), aged between 26 and 35 years (see Table 2).

Dental development and long bone length suggested that Skeleton 5 was an infant, aged around twelve months. Age was assessed using only dental development in Skeletons 6 and 9. Skeleton 6 was a six to nine month old infant, while Skeleton 9 was a four to six year old juvenile.

It was not possible to establish age in the majority of disarticulated bone fragments. It was notable that no adolescent bones were present and that the juvenile bones all belonged to individuals aged six years or younger (Appendix A). There were many infant bones, particularly long bones. Evidence for a mature adult male and a middle adult male was found. The other adult bones could not be aged more precisely.

2.4 SEX DETERMINATION

Sex determination was carried out using standard osteological techniques, such as those described by Mays and Cox (2000). Assessment of sex in both males and females relies on the preservation of the skull and the pelvis and can only be carried out once sexual characteristics have developed, during late puberty and early adulthood.

On the basis of the hip and skull characteristics, Skeleton 2 was a male (see Table 2). Sex determination was less conclusive in Skeleton 3, who was thought to be male the basis of long bone joint measurements. The sex of female Skeleton 4 was based on the sexing characteristic of the skull and on measurements. No sexing criteria survived for Skeleton 7. However, this individual was so unusually big and well-built that it is highly unlikely to have been female.

It was not possible to determine sex in the immature individuals.

Sex could be established in a number of disarticulated remains (Appendix A). Four long bones probably belonged to males, as well as four pelvis fragments, two of which were duplicated and both belonged to mature adult males. A humerus was thought to belong to a female.

2.5 METRIC ANALYSIS

Stature depends on two main factors, heredity and environment. However, stature can also fluctuate between chronological periods. Stature can only be established in skeletons if at least one complete and fully fused long bone is present. The bone is measured on an osteometric board, and stature is then calculated using a regression formula developed upon individuals of known stature.

In this instance, it was possible to assess stature in two of the adult skeletons (see Table 1). The single female was 155.49cm tall. This is shorter than the medieval mean stature for females (158.6cm) calculated by Caffell (1997). One of the males (Skeleton 2) was 173.15cm tall (see Table 1). This is taller than the stature calculated for medieval males (170.5cm) by Caffell (1997). Because of the small size of the sample it was not possible to interpret this data.

Leg measurements were obtained from the femora and tibiae and used to calculate robusticity indices. The *platymeria* index is a method of calculating the shape and robusticity of the femoral shaft. The left femur of Skeleton 2 and both femora of Skeleton 4 were *platymeric* (broad and flat), while the right femur of Skeleton 2 was *eurymeric* (more rounded).

The *platycnemia* index of the tibiae was calculated in order to establish the degree of tibial shaft flatness. The tibial shafts of Skeletons 2, 4 and 8 were *eurycnemic* (of average dimensions), while the left tibial shaft of Skeleton 5 was flatter (*mesocnemic*).

It was not possible to measure the crania, because severe fragmentation meant that the skulls were too incomplete.

2.6 NON-METRIC TRAITS

Non-metric traits are additional sutures, facets, bony processes, canals and foramina, which occur in a minority of skeletons and are believed to suggest hereditary affiliation between skeletons (Saunders 1989). The origins of non-metric traits have been extensively discussed in the osteological literature and it is now thought that while most non-metric traits have genetic origins, some can be produced by factors such as mechanical stress (Kennedy 1989) or environment (Trinkhaus 1978).

A total of thirty cranial (skull) and thirty post-cranial (bones of the body and limbs) non-metric traits were selected from the osteological literature (Buikstra and Ubelaker 1994, Finnegan 1978, Berry and Berry 1967) and recorded. The disarticulated bones were also scanned for non-metric traits.

Only a small number of non-metric traits were observed on the skull. These were anomalies that would not have affected the individual. Cranial traits are more likely to be genetic in origin than those noted on the remaining part of the skeleton, which can often be affected by mechanical stress.

Cranial non-metric traits observed included *bridging of supraorbital notch* (a separate foramen above the eye orbit) in Skeletons 2 and 4. Other cranial non-metric traits included *ossicles in the lambdoid suture* (an additional bone in the suture at the back of the head) in Skeleton 4. These minor anomalies were probably genetic in origin.

Common post-cranial traits included additional facets on the ankle bones (*double inferior talar facets, double anterior calcaneal facets*, *peroneal tubercles*) in Skeletons 1, 2, 4 and 7. Traits that are thought to be activity-related included a *hypotrochanteric fossa* in Skeleton 4. This is a depression on the back of the thigh bone where the large bottom muscle, *gluteus maximus* attaches. Tibial squatting facets were noted in Skeletons 4, 7 and 8 and are thought to be related to habitual squatting. Other post-cranial traits observed were only seen in one skeleton and are listed in Appendix A.

Non-metric traits were not observed in the children's skeletons.

2.7 CONCLUSION

Osteological analysis of the skeletal remains established that this was a mixed cemetery, containing young children and adults. The female was slightly shorter than the average medieval stature, while the male was somewhat taller. One of the males, whose bones could not be measured, was of unusually robust build.

3.0 PATHOLOGICAL ANALYSIS

Pathological conditions (disease) can manifest themselves on the skeleton, especially when these are chronic conditions or the result of trauma to the bone. The bone elements to which muscles attach can also provide information on muscle trauma and excessive use of muscles.

3.1 CONGENITAL ANOMALIES

Plate 1 *Spondylolysis* of 5th lumbar vertebra of Skeleton 4

Heredity and environment can predispose an individual to congenital anomalies. Congenital malformations are commonly observed in archaeological populations. Most congenital conditions observed in skeletons are simple anomalies, which do not affect the person exhibiting the defect. *Spondylolysis* refers to a condition which is characterised by the separation of a vertebra into two parts, the vertebral body and the spinous process (Merbs 1996). This occurs mostly in the lumbar vertebrae and is the result of genetic predisposition and repetitive stress or fatigue fracturing, often caused by mechanical loading of the spine. It may also be congenital in origin, but in that case it tends to affect the cervical vertebrae. The condition may cause pain (Albanese and Pizzutillo 1982, 499). Skeleton 4, a young middle adult female suffered from *spondylolysis* of the fifth lumbar vertebra (Plate 1). The spinous process was separated entirely from the vertebral body. The occurrence of the condition in the lower part of the spine suggests that in this instance, it was activity-related.

3.2 INFECTION

Evidence for infection was observed in Skeletons 2 and 4 (see Table 1). The infection was characterised by superficial inflammatory lesions on the surfaces of the tibiae in both individuals. Tibiae are the most likely bones to show evidence for inflammation because they are more vulnerable to knocks than other parts of the body. The type of skeletal lesion (lamellar bone) on the skeletons' shin bones suggested that the inflammation was receding.

Inflammatory lesions on human bones can be indicative of infectious diseases, such as leprosy and syphilis, and of non-specific localised infection, such as varicose veins, leg ulcers or trauma to the shins. However, the lesions only form in the bone if the inflammation is chronic and long-standing (Roberts and Manchester 1995, 125). Evidence for infection was common before the introduction of antibiotics and is therefore frequently observed in populations derived from archaeological contexts.

Periosteal inflammatory lesions were also noted on two disarticulated tibiae and a left femur from the charnel pit (Appendix A).

3.3 DEGENERATIVE JOINT DISEASE

The term joint disease encompasses a large number of conditions with different causes, which all affect the articular joints of the skeleton. Factors influencing joint disease include physical activity, occupation, workload and advancing age, which manifest as degenerative joint disease and osteoarthritis. Alternatively, joint changes may have inflammatory causes in the *spondyloarthropathies*, such as sceptic or rheumatoid arthritis. Different joint diseases affect the articular joints in a different way, and it is the type of lesion, together with the distribution of skeletal manifestations, which determines the diagnosis.

3.3.1 DJD

The most common type of joint disease observed tends to be degenerative joint disease (DJD). DJD is characterised by both bone formation (osteophytes) and bone resorption (porosity) at and around the articular surfaces of the joints, which can cause great discomfort and disability (Rogers 2001).

Four individuals showed evidence for DJD (Table 1). Degeneration was largely observed in the spine of Skeletons 2, 3 and 4. As expected, Skeleton 2, who was a mature adult had the worst lesions, while the degeneration was mild in the case of the young middle adults (Skeleton 3 and 4). The intervertebral discs are the 'shock absorbers' of the spine, but these can degenerate as a result of gradual desiccation, which then causes transmission of the stress from the vertebral discs to the articular facets and ligaments (Hirsh 1983, 123). Spinal osteophytes (outgrowths of bone) form in response to the constant stress that is placed on the spine as a result of human posture (Roberts and Manchester 1995, 106) to compensate. Increasing stress or activity can therefore lead to increased size and prevalence of osteophytes (*ibid*).

DJD was also noted in other joints, including the hips, left ulna and thumbs of Skeleton 2, the ribs of Skeleton 3 and 1524 and the knee of Skeleton 7. In the disarticulated remains, one cervical, a thoracic and a lumbar vertebra showed evidence for DJD (Appendix A).

3.3.2 Osteoarthritis

Osteoarthritis is a degenerative joint disease characterised by the deterioration of the joint cartilage, leading to exposure of the underlying bony joint surface. The resulting bone to bone contact can produce polishing of the bone termed 'eburnation', which is the most apparent expression of osteoarthritis. Osteoarthritis can be the result of mechanical stress and other factors, including lifestyle, food acquisition and preparation, social status, sex and general health (Larsen 1997, 179).

A proximal first hand phalanx joint (thumb) from the disarticulated assemblage showed evidence for eburnation. It is possible that age or trauma had contributed to the onset of this condition. Modern studies have found no correlation between the expression of osteoarthritis and the severity of pain (Cockburn *et al* 1979). It is therefore not clear, whether this individual would have suffered discomfort as a result of the lesion in his thumb.

3.3.3 Schmorl's Nodes

A different condition which affects the spine is Schmorl's nodes. Schmorl's nodes are indentations in the upper and lower surfaces of the vertebral bodies, most commonly in the lower thoracic vertebrae (Hilton *et al* 1976). Schmorl's nodes can result from damage to the intervertebral discs, which then impinge onto the vertebral body surface (Rogers 2001), and may cause necrosis (death) of the surrounding tissue. Rupture of the discs only occurs if sufficient axial compressive forces are causing pressure on the central part of the discs; frequent lifting or carrying of heavy loads can cause this.

Plate 2 Schmorl's node of Skeleton 2

Schmorl's nodes were observed in the lower spines of Skeletons 2 and 3, both males (Plate 2). The high prevalence of Schmorl's nodes in this assemblage (considering the scarcity of spines) might be attributed to the physical stresses these individuals underwent in their daily activities.

3.4 TRAUMA

3.4.1 Fractures

The neck (vertebral end) of the second right rib of mature adult male (Skeleton 2) exhibited an oblique fracture (Plate 3). The broken ends overlapped by 20mm and exhibited considerable irregular bone formation, otherwise the fracture was well-healed. Tomczak and Buikstra (1999, 255) found that impact from the back tends to fracture ribs near the spine. Upper rib fractures are associated with extreme force (*ibid*). Isolated rib fractures can heal quickly and are nowadays often treated in the same way as severe bruises (Dandy and Edwards 1998, 159). It is therefore likely that this individual had sustained the rib injury from the back with some force.

Plate 3 Rib fracture of Skeleton 2

The same skeleton had also suffered from a clavicle fracture (Plate 4); these fractures are amongst the most common fractures in modern patients (Dandy and Edwards 1998, 181). Many are caused by landing on an outstretched hand or by direct impact against a bone, as is caused by being thrown off a horse and landing on the ground. The clavicle fracture was well-healed, and as clavicles take around six weeks to heal (Dandy and Edwards 1998, 182), this injury was at least this old. However, mal-alignment at the fracture site caused considerable bone distortion and sinuses (pus-releasing cavities) at the fractured point of the bone suggested that infection had taken hold, at least for some time after the injury.

Plate 4 Clavicle fracture of Skeleton 2

Skeleton 3, a young middle adult, also exhibited a fracture of the right clavicle. However, in this case the bone was very well-healed and only slight widening of the fractured part suggested that a fracture had occurred.

Skeleton 2 also suffered from a fracture of the head of the left ulna (Plate 5). This is the rounded joint of the ulna that articulates with the wrist bones. It is probable that this injury occurred during childhood (Dandy and Edwards 1998, 211). The fracture site is well-healed, but it is possible that the degenerative joint disease observed in both joints of the ulna is a secondary complication of the injury.

Plate 5 Ulna head fracture of Skeleton 2

It is possible that the three fractures observed in Skeleton 2 are related. He may have been knocked into the back by a moving object and then fell forward onto his outstretched hands.

3.4.2 Activity-Related Trauma

Occasionally, it is possible to infer trauma to the soft tissue on the bones, in the form of ligamentous or muscular trauma. This is expressed through the formation of bony processes (*enthesopathies*) at the site of ligament attachments. Additionally, it is possible to observe bone defects at the site of muscle insertions, which are the result of constant micro-trauma and are usually activity-related (Hawkey and Merbs 1995, 334).

The majority of muscular trauma was noted in the arms. Skeleton 2, a mature adult male, exhibited bone defects at the attachment sites of *pectoralis major* on the right humerus (moves arm at shoulder) (Plate 6) and for *triceps* (extends forearm), *brachialis* (flexes forearm) and *pronator quadratus* (flexes forearm and hand) on the ulnae (Stone and Stone 1990). Bone excavations at the attachment of the costoclavicular ligaments were noted in Skeletons 2 and 3; muscular trauma at this site is very common in populations from archaeological contexts.

Plate 6 Humerus with *pectoralis major* bone excavation of Sk 2

Skeleton 2 had large *enthesopathies* at the attachment sites for *gluteus maximus* (extends trunk and hip, laterally rotates hip), *adductor longus* (adducts thigh at hip, aids in lateral rotation), *gluteus minimus* (abducts femur at hip and rotates thigh medially) and the *iliofemoral* ligament (Stone and Stone 1990). Skeleton 2 showed evidence for muscular trauma in the form of *enthesopathies* on the knee for *rectus femoris*, a muscle that extends the leg at the knee joint and flexes the thigh at the hip joint (*ibid*, 166). He also showed evidence for trauma to the Achilles' tendon, which flexes the foot downwards (*ibid*, 185); this type of trauma may also be related to squatting (although this is one of the few skeletons without squatting facets, discussed above). An *enthesopathy* on the left fibula of Skeleton 2 implied that this individual had suffered trauma to the anterior *talofibular* ligament (ankle muscles).

The extensive muscular trauma observed in Skeleton 2 suggests particular strain to the muscles that flex and extend the forearm and those that move the hip and thigh. They might be indicative of a habitual activity, or of traumatic accidents that also caused his three bone fractures.

Skeleton 4 also had a bone excavation on the right ulna for *brachialis*. Skeleton 7 had an *enthesopathy* at the attachment site of *adductor longus.*

3.4.3 Scheuermann's Disease

A young middle adult male (Skeleton 3) suffered from Scheuermann's disease (Plate 7). This is a circulatory disorder that usually affects individuals during adolescence, often with a male predominance (Aufderheide and Rodríguez-Martín, 1998, 87). The cause of the condition is not yet fully understood, but it is thought that there are genetic causes, as well as traumatic factors involved (*ibid*). The condition is characterised by erosion of the anterior margins of the vertebral bodies in the lower spine, often associated with loss in height of the vertebrae and therefore kyphosis (bending of the spine) (*ibid*). The lesions are also frequently associated with Schmorl's nodes, as was the case in this man.

Plate 7 Scheuermann's of thoracic a vertebra of Skeleton 3

3.5 MISCELLANEOUS PATHOLOGY

Arachnoid granulations are small, well-defined depressions on the inner (endocranial) surface of the skull. They tend to cluster at the frontal and parietal, especially at the border between these three skull parts (Mann and Murphy 1990, 26). They are common in all populations and have a tendency to increase in number and depth with advancing age. The cause for the formation of *arachnoid granulations* has not yet been understood. Older females tend to be predominantly affected, especially following menopause, although males do exhibit the lesions as well. Skeleton 2, the mature adult male, exhibited small clusters of *arachnoid granulations* on the endocranial (inner) surface of the frontal bone. Arachnoid granulations were also observed in Skull 2 from the charnel pit. This skull belonged to a mature adult female.

3.6 CONCLUSION

The skeletal evidence suggests that the majority of adults suffered from degenerative joint disease, which was mostly affecting the spine and is thought to have been activity-related. It is probable that the large number of injuries observed in the mature adult male (Skeleton 2) was also activity-related. He had suffered from fractures to his collar bone, an upper rib and his wrist and trauma to the spine thought to be caused by load-bearing. He also exhibited muscular trauma to those muscles that flex and extend the forearm, move the hip and thigh and the ankle, all indicating that this individual led a life of strenuous physical activity. The inflammatory lesions on his shins might have been caused by activity-related bumps and falls. This man had some secondary complications to his injuries; the fractured wrist had caused secondary joint disease in his elbow and wrist, while he had suffered from severe infection of his collar bone following the fracture as well as mal-aligned healing of the bone. Another male from the same site, who had also fractured his collar bone, faired much better: his collar bone was so well-healed that the fracture site was almost indiscernible.

The remaining adult skeletons displayed mild manifestations of the lesions observed in Skeleton 2; the female (Skeleton 4) also suffered from inflammatory lesions of the tibiae, spinal joint disease and muscular trauma, while the two males (Skeletons 3 and 7) exhibited evidence for the latter two conditions.

The two infants did not display any evidence for disease, which is not uncommon. Children usually die so quickly that skeletal lesions cannot develop.

The pathological manifestations observed in the disarticulated remains mirrored those noted in the individual skeletons. Three bones were found that showed evidence for inflammation, while three vertebrae exhibited evidence for degenerative joint disease.

4.0 DENTAL HEALTH

Analysis of the teeth from archaeological populations provides vital clues about health, diet and oral hygiene, as well as information about environmental and congenital conditions. Many of the jaws were incomplete as a result of post-depositional factors. Skeletons 2, 3 4, 5, and 6 had surviving teeth. Of the total 88 tooth positions present, 70 teeth were recovered. Of these, 57 were permanent teeth and thirteen deciduous teeth (Table 2).

Table 2 Summary of dental pathology

Skeleton No	Number of teeth present	Calculus	Caries	Abscesses	DEH	Infractions	Wear	Periodontitis
2	20 permanent	6	4	-	-	2	Severe	Moderate
3	13 permanent	11	-	1	4	-	Moderate	Slight
4	24 permanent	21	-	-	3	-	Moderate	Slight
5	12 deciduous	-	-	-	-	-	Slight	-
6	1 deciduous	-	-	-	-	-	Slight	-

Five teeth had been lost ante-mortem, while a further five teeth had been lost post-mortem. The ante-mortem tooth loss was probably caused by age in the case of Skeleton 2 and a dental abscess in the case of Skeleton 3.

The left third molar of Skeleton 3 was not present. Notably, the left maxillary and right mandibular third molars of Skeleton 4 were also not present, nor were this young middle adult female's upper second incisors and lower first incisors (Plate 8). It is likely that her teeth were absent because she had a very small jaw and there was simply no room for them. Hypodontia, a condition characterised by missing teeth, is relatively common, although normally only one or to teeth are missing, rather than six, as in this case.

Plate 8 Hypodontia of Skeleton 4

Dental wear tends to be more common and severe in archaeological populations than in modern teeth. Severity of the dental wear was assessed using a chart developed by Smith (1984). Each tooth was scored using a grading system ranging from 1 (no wear) to 8 (severe attrition of the whole tooth crown). Dental wear was slight to moderate in the infants and young adults, but was severe in the mature adult, as expected (see Table 1).

Calculus (dental plaque) is commonly observed in archaeological populations whose dental hygiene was not a rigorous as it is today. Calculus mineralises and forms concretions on the tooth crowns, along the line of the gums. Calculus was observed in 54% of teeth, or 67% of adult teeth and was slight to moderate.

It is possible that activity-related trauma or an accident caused the infractions (dental chipping) of two anterior teeth of Skeleton 2, a mature adult male. Wear on the chipped parts of the teeth implies that these injuries had occurred some time before death.

Skeleton 3 suffered from one dental abscess (see Table 2), which was located around the root of the left mandibular first molar. The infection was localised, causing a hole to form at the base of the tooth roots, which had released pus from the bone into the mouth. It is probable that the infections were extremely painful. Even today, with the availability of antibiotics, dental abscesses can be very persistent. In the past, however, they must have played a more significant role, debilitating and causing extreme pain, weakening the immune system and, if the infection entered the bloodstream, causing fatal septicaemia. In this case, the abscess was well-healed, suggesting that the individual had survived the infections. The tooth affected by the abscess had been lost ante-mortem, but it is probable that the infection had developed as a result of caries lesions (cavities).

Caries (tooth decay) are multi-factoral in origin, but develop as a result of aggressive bacterial attack in the presence of sucrose (Hillson 1996, 282) and fermentable carbohydrates (Roberts and Manchester 1995, 47). Skeleton 2 had suffered from four caries lesions. The lesions affected the premolars and molars. The teeth at the back of the mouth are hardest to clean and are therefore most likely to be affected by caries. This gives a prevalence rate of 7% of caries lesions in the adult group. It is likely that this individual had further cavities, causing ante-mortem tooth loss of four molars.

Dental enamel hypoplasia (DEH) was observed in Skeletons 3 and 4 – a young middle adult male and female. DEH is the manifestation of lines, grooves or pits on the crown surface of the teeth, which represent the cessation of crown formation. The defects are caused by periods of severe stress during the first to seventh year of childhood, including malnutrition or disease. DEH was observed in seven adult teeth (12%), all of which were anterior teeth (see Table 2).

In the disarticulated bone assemblage, fifteen deciduous teeth and 37 permanent teeth were found. One jaw belonging to a mature adult female (Skull 2) was completely edentulous – all the teeth had been lost ante-mortem. DEH was observed in Skull 7/8, which belonged to an old middle adult male and a maxilla recovered from the charnel pit. Skull 4/5, a young middle adult male, had a large cavity.

The dental health of the population was relatively good, with the worst dental health observed in the oldest individual, as anticipated.

5.0 MORTUARY PRACTICE

The skeletons found at St Andrew's Church, Corbridge were interred in single flat graves. They are thought to date to the thirteenth to fifteenth century. All the skeletons were buried in a similar manner, in supine extended positions, with the arms beside the body or crossed over the abdomen or chest. The skeletons were orientated with the heads to the west and the feet to the east. No evidence for coffins was found; it is therefore likely that the skeletons were buried in simple shrouds.

The burial ritual at Corbridge corresponds with that normally observed during the medieval period. Burials from this period tend to lie on their backs, with extended legs and the arms in a variety of relatively orderly positions. Burial can occur in coffins, or in simple shrouds. The burials excavated had been found on the north side of the church. This side was often reserved for children and anomalous burials, but occasionally, individuals who wanted to be particularly pious asked specifically to be buried on this side of the church, as it was seen as less desirable.

6.0 DISCUSSION AND SUMMARY

In common with most other medieval parish church cemeteries, the Corbridge assemblage represented a densely used plot, with burials intercutting one another and bones from one disturbed burial replaced into the backfill of another, or interred in charnel pits, as was the case at Corbridge. The burials were all in extended supine positions, in the typical Christian manner. Their heads were at the western end of the grave and the feet at the eastern end. Notably, no evidence for coffins was found, suggesting that the bodies had been interred in shrouds. The skeletal remains were in a poor to good condition and were largely incomplete. This was caused by later grave digging disturbing earlier burials.

Osteological analysis of the skeletal assemblage from Corbridge has provided a glimpse into the lives of the people buried there. The small group of skeletons included three males, two of whom were middle-aged and one who was mature. One female was recovered, who was also middle-aged, and the disarticulated assemblage contained a mature adult female. The sex of the sixth adult was undetermined. The population also included a minimum number of six children, comprising of three juveniles under the age of six and three infants.

The oldest individual of the group, a mature adult male, had suffered from a large number of injuries. He had sustained three fractures, to the clavicle, a rib and his left wrist. All of the fractures were well-healed, suggesting that they had occurred some time before he died. However, he had suffered from secondary complications in the form of severe infection and mal-alignment of the collar bone fracture and degenerative joint disease in his left elbow and wrist, secondary to the ulna fracture. This man also displayed considerable evidence for muscular trauma; especially for those muscles that extend and flex the forearm, the hip and the thigh. He also had chipped front teeth and inflammation of the shins. It is possible that many of the injuries occurred during one incident, or alternatively, that they accumulated over a long and hard life.

Although this man's injuries were severe, it is likely that physically demanding tasks were undertaken by all of the adults in this population. Activity-related degenerative disease was observed in all adult skeletons and was most prevalent in the spines. Several vertebrae also displayed evidence for trauma caused by load-bearing. Evidence for trauma to those muscles responsible for moving the arm, shoulder and hips was noted in the majority of skeletons and many disarticulated bones. It is also feasible that the inflammation on the shins of a male and a female, as well as three disarticulated leg bones was caused by work-related incidents.

The presence of at least three young juveniles under the age of six, as well as a bare minimum of three infants under one year suggests that the children's death rate was high, as they represent 50% of the population excavated. It is, however, possible that this high percentage is due to the location of the excavation trench, as children's skeletons are more likely to be found on the north side of the church. Nevertheless, it suggests that infants died at between six to twelve months, which might have been related to problems with weaning and inadequate solid food intake (M. Lewis. *pers. comm.* 2006). Alternatively, these deaths may be due to common childhood diseases, such as diarrhea or measles. These are the sort of diseases that the slightly older children, between the ages of two and six might also have succumbed to. The presence of *dental enamel hypoplasia* lesions in two of the adult skeletons confirms that the population was subject to episodes of malnutrition or disease between six months of age and seven years. The lack of adolescents and young adults suggests that those who survived early childhood were likely to survive to middle age.

Dental hygiene was moderate in this population, with a high prevalence of dental plaque, but a low number of cavities and dental abscesses. The small number of cavities might be due to good tooth cleaning practices, or may have been related to a diet low in sugar and carbohydrates.

The excavation of this small sample of the St Andrew's, Corbridge cemetery provides an insight into the health of this community. The individuals were buried in simple shrouds, regardless of their age. The skeletal evidence suggests that young children suffered from episodes of stress, perhaps related to a childhood illnesses, weaning problems or to malnutrition, causing some children to die. Activity-related strain to the skeletons was observed in all of the adults; injuries, inflammations and degenerative joint disease were the price paid for the strenuous physical activities carried out by this population.

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APPENDIX A: OSTEOLOGICAL AND PALAEOPATHOLOGICAL CATALOGUE

INHUMED SKELETONS

Skeleton Number	**1**
Preservation	Good
Completeness	4%, calcanei, fibulae, parts of tibiae
Age	Adult
Sex	-
Stature	-
Non-Metric Traits	peroneal tubercle (bilateral)
Pathology	-
Dental Health	-

Skeleton Number	**2**
Preservation	Moderate
Completeness	95%, all but some vertebrae and parts of the right hand and feet
Age	46+, mature adult
Sex	Male
Stature	173.15 ± 4.32cm
Non-Metric Traits	Ossicle at bregma (bilateral), mastoid foramen extrasutural (bilateral), posterior condylar canal open (bilateral), bridging of supraorbital notch (bilateral), accessory supraorbital foramen (right), exostosis in trochanteric fossa (bilateral), third trochanter (bilateral), lateral tibial squatting facet (bilateral), absent anterior calcaneal facet (bilateral)
Pathology	DJD in hips, spine, left elbow,, 1st metacarpals, Schmorl's nodes, *enthesopathies*, bone excavations, periostitis on tibiae, fracture of left ulna, right second rib, right clavicle, *arachnoid granulations*
Dental Health	Moderate periodontitis, 21/32 teeth present, 4 teeth lost ante-mortem, 6/21 teeth with calculus, 4/21 teeth with caries, infractions on buccal crowns of both anterior maxillary first incisors

	Right Dentition								Left Dentition							
Present	-	AM	AM	P	P	PM	-	P	P	-	PM	P	P	P	AM	AM
Calculus	-	-	-	-	-	-	-	Sb	-	-	-	-	-	-	-	-
DEH	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Caries	-	-	-	-	-	-	-	-	-	-	-	Md	Mm	-	-	-
Wear	-	-	-	5	5	-	-	4	4	-	-	6	6	7	-	-
Maxilla	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Mandible	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Present	P	P	Pu	P	PM	P	P	P	P	P	P	P	P	P	P	P
Calculus	Ml	Sl	-	-	-	-	-	-	-	-	-	-	-	Fl	Ml	Ml
DEH	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Caries	-	Mm	La	-	-	-	-	-	-	-	-	-	-	-	-	-
Wear	3	5	-	6	-	5	5	6	6	6	5	5	5	7	6	6

Skeleton Number	**3**
Preservation	Good
Completeness	10%, mandible, spine, right shoulder
Age	26-35, young middle adult
Sex	Male
Stature	-

Non-Metric Traits	Accessory acromiale facet (right)
Pathology	DJD in ribs, spine, Schmorl's nodes, fracture of right clavicle, Scheuermann's
Dental Health	Slight periodontitis, 13/32 teeth present, 1 tooth lost ante-mortem, 5/13 teeth with DEH, 11/13 teeth with calculus

	Right Dentition								Left Dentition							
Present	P	P	P	P	P	P	P	P	P	-	-	-	-	-	-	-
Calculus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
DEH	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Caries	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Wear	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Maxilla	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Mandible	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Present	P	P	P	P	P	P	PM	P	P	P	P	P	P	AM	P	NP
Calculus	-	-	Sb	Fa	Sa	Mb	-	Mb	Mb	Mb	Sb	Sb	Sb	-	Fb	-
DEH	-	-	-	-	-	G	-	L	L	L	G	G	-	-	-	-
Caries	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Wear	2	3	2	2	2	2	-	4	4	3	3	3	2	-	2	-

Skeleton Number	**4**
Preservation	Good
Completeness	80%, all but lower left arm, upper left femur, right fibula, left pelvis, sacrum
Age	26-35, young middle adult
Sex	Female
Stature	155.49 ± 3.66cm
Non-Metric Traits	Ossicle in lambdoid (bilateral), double anterior condylar canal open (bilateral), bridging of supraorbital notch (right), absent zygomaticofacial foramen (left), hypotrochanteric fossa (right), lateral tibial squatting facet (bilateral), peroneal tubercle (bilateral), double anterior calcaneal facet (bilateral), double inferior talar facet (right)
Pathology	Slight DJD in spine, clavicles, periostitis of right tibia, *spondylolysis* of L5, bone excavations
Dental Health	Slight periodontitis, 23/32 teeth present, 6 teeth congenitally absent, 3/23 teeth with DEH, 21/23 teeth with calculus

	Right Dentition								Left Dentition							
Present	-	P	PM	P	P	P	NP	P	P	NP	P	P	P	P	P	NP
Calculus	-	Fa	-	Fd	Mb	Mb	-	-	Sb	-	Mb	Mb	Sb	Mb	Fa	-
DEH	-	-	-	-	-	-	-	L	L	-	L	-	-	-	-	-
Caries	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Wear	-	2	-	3	3	2	-	3	3	-	3	3	4	4	3	-
Maxilla	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Mandible	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Present	NP	P	P	P	P	P	PM	NP	NP	P	P	P	P	P	P	P
Calculus	-	Sa	Sl	Sl	Ma	Ma	-	-	-	Ma	Ma	Sa	Sb	Sa	Sa	-
DEH	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Caries	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Wear	-	2	3	2	2	2	-	-	-	3	3	2	2	3	2	1

Skeleton Number	**5**
Preservation	Moderate
Completeness	20%, right arm, right ribs, vertebrae

Age	12 months, infant
Sex	undetermined
Stature	-
Non-Metric Traits	-
Pathology	-
Dental Health	12 teeth present

Present	P	P	P	-	-	-	P	-	-	-
Calculus	-	-	-	-	-	-	-	-	-	-
DEH	-	-	-	-	-	-	-	-	-	-
Caries	-	-	-	-	-	-	-	-	-	-
Wear	1	1	1	-	-	-	1	-	-	-
Maxilla	**e**	**d**	**c**	**b**	**a**	**a**	**b**	**c**	**d**	**e**
Mandible	**e**	**d**	**c**	**b**	**a**	**a**	**b**	**c**	**d**	**e**
Present	p	p	P	P	P	P	-	-	P	P
Calculus	-	-	-	-	-	-	-	-	-	-
DEH	-	-	-	-	-	-	-	-	-	-
Caries	-	-	-	-	-	-	-	-	-	-
Wear	1	1	1	1	1	1	-	-	1	1

Skeleton Number	**6**
Preservation	Poor
Completeness	15%, right arm
Age	6-9 months, infant
Sex	undetermined
Stature	-
Non-Metric Traits	-
Pathology	-
Dental Health	1 tooth

Present	-	-	-	-	-	-	-	-	-	-
Calculus	-	-	-	-	-	-	-	-	-	-
DEH	-	-	-	-	-	-	-	-	-	-
Caries	-	-	-	-	-	-	-	-	-	-
Wear	-	-	-	-	-	-	-	-	-	-
Maxilla	**e**	**d**	**c**	**b**	**a**	**a**	**b**	**c**	**d**	**e**
Mandible	**e**	**d**	**c**	**b**	**a**	**a**	**b**	**c**	**d**	**e**
Present	-	-	-	-	-	-	-	-	P	-
Calculus	-	-	-	-	-	-	-	-	-	-
DEH	-	-	-	-	-	-	-	-	-	-

Caries	-	-	-	-	-	-	-	-	-	-
Wear	-	-	-	-	-	-	-	-	1	-

Skeleton Number	**7**
Preservation	Moderate
Completeness	15%, parts of left leg
Age	18+, adult
Sex	Male?
Stature	-
Non-Metric Traits	Lateral tibial squatting facet (left), peroneal tubercle (left)
Pathology	Slight DJD in right knee, *enthesopathy*

Skeleton Number	**8**
Preservation	Good
Completeness	10%, right lower leg
Age	18+, adult
Sex	undetermined
Stature	-
Non-Metric Traits	Lateral tibial squatting facet (left), medial talar facet (left)
Pathology	None

KEY:
Present - Tooth presence; am - ante-mortem tooth loss; pm - post-mortem tooth loss; p - tooth present; - - jaw not present
Caries - Calculus; F - flecks of calculus; S - slight calculus; M - moderate calculus; H - heavy calculus; a - all surfaces; b - buccal surface; d - distal surface; m - mesial surface; l - lingual surface; o - occlusal surface
DEH - dental enamel hypoplasia; l - lines; g - grooves; p - pits
Caries - caries; s - small lesions; m - moderate lesions; l - large lesions
Wear - dental wear; numbers from 1-8 - slight to severe wear

DISARTICULATED HUMAN BONES

Context	**Context Type**	**Bones**	**Percentage of Bone Present**	**Side**	**Age**	**Sex**	**Other**
11	Skeleton 1	Tibia	40	Left	Adult?	-	Central shaft
		Humerus	65	Left	Adult	-	Distal ¾
		Humerus	45	Left	Adult	-	Distal ½
		Humerus	100	Right	0.5-1	-	All. Bone excavation for teres major
		Humerus	75	Left	0.5-1	-	Proximal ¾. Bone excavation for teres major, paired with above
		Femur	55	Left	Adult	-	Shaft
		Femur	45	Left	Juvenile	-	Proximal ½
		Femur	40	Left	Infant	-	Proximal ½
		Femur	1	-	Adult	Male?	Head
		Pelvis	30	Right	Juvenile	-	Parts of right ilium
		Metatarsal	100	Right	Adult	-	All

Context	Context Type	Bones	Percentage of Bone Present	Side	Age	Sex	Other
		Scapula	15	Right	Adult	-	Acromion
		Ribs	30	Left	Juvenile	-	Shaft fragment
		Skull	10	-	Adult?	-	Petrous temporal and cranial fragments
		Cuneiform	100	Left	Adult	-	Left lateral cuneiform
		Long bone	-	-	-	-	2 shaft fragments
12	-	Humerus	60	Right	Adult	-	Distal 2/3
		Tibia	50	Right	Juvenile	-	Proximal shaft, slight soleus bone excavation
		Tibia	10	-	-	-	Central shaft fragment, slight periostitis on medial surface
		Radius	20	Right	Adult	-	Proximal ¼
		Ulna	50	Right	Adult	-	Shaft
		Ulna	70	Right	Infant	-	Proximal ¾
		Femur	40	-	Adult	-	Central shaft
		Femur	55	Right	Juvenile	-	Proximal ½
		Femur	95	Right	Infant	-	Almost all
		Femur	85	Right	Infant	-	Proximal ¾, slightly longer than the above
		Femur	30	-	Juvenile	-	Distal 1/3
		Fibula	30	-	Adult	-	Central shaft, large (paired with general scatter?)
		Ribs	30	-	-	-	Shaft fragment
		Talus	100	Left	Adult	-	All
		Pelvis	20	Left	Adult	-	Ischium
		Skull	1	-	-	-	1 cranial fragment
13	Skeleton 3	Femur	85	Right	Adult	-	Shaft, bone excavation for gluteus maximus
		Femur	2	-	-	-	Distal epiphysis, 2 fragments
		Femur	25	Right	Juvenile	-	Proximal 1/3
		Femur	25	Right	Infant	-	Proximal shaft
		Ulna	85	Right	Adult	-	Shaft
		Radius	50	Right	Adult	-	Proximal ½, might have been paired with above
		Radius	10	Left	Adult	Male??	Head and neck
		Radius	40	Left	Juvenile	-	Proximal 1/3
		Tibia	1	-	Adult	-	Proximal epiphysis fragment
		Skull	5	-	Adult?	-	5 cranial fragments
		Metatarsals	100	Left	Adult	-	1st metatarsal
		Metatarsals	100	Left	Adult	-	3rd metatarsal
		Metacarpals	95	Left	Adult	-	1st, 3rd, 5th metacarpals
		Metacarpals	95	Left	Adult	-	3rd metacarpal
		Metacarpals	100	Right	Adult	-	2nd metacarpal
		Phalanges	100	-	Adult	-	Proximal hand phalanx
		Vertebrae	30	-	Juvenile	-	Cervical spinous process fragment
		Vertebrae	100	-	Adult	-	L5
		Sacrum	15	-	Adult	-	3 sacrum fragments of wings, spinous processes
		Ribs	20-60	Left	Adult	-	4 rib shafts
		Ribs	15	-	-	-	6 rib shaft fragments

Context	Context Type	Bones	Percentage of Bone Present	Side	Age	Sex	Other
		Ribs	20	Left	-	-	1st rib sternal end
14	Skeleton 7	Radius	10	-	-	-	Head
		Scapula	70	Left	Infant	-	Blade and acromion
		Pelvis	30	Left	Infant	-	Left ilium, 2 fragments
		Pelvis	5	Left	Mature adult	Male	Pubic symphysis
		Pelvis	2	Right	Middle adult	Male?	Pubic symphysis
		Pelvis	2	-	-	-	2 pubic fragments
		Ribs	30	Left	Adult	-	First rib head, neck and shaft
		Skull	30	-	9-12 months	-	5 cranial fragment, temporal fragment, right mandible with both deciduous 1st molars and permanent first molars and right deciduous 2nd molar
		Tooth	100	Right	Middle adult	-	2nd maxillary molar
		Phalanx	100	-	Adult	-	Distal hand phalanx
		Unidentified	-	-	-	-	2 fragments
	General Scatter	Femur	15	Left	Adult	-	Head, neck and proximal shaft
		Femur	3	-	Adult	-	Head
		Femur	1	-	-	-	Distal epiphysis fragment
		Femur	5	-	Adult	-	Parts of neck
		Femur	20	-	Infant	-	Parts of lower shaft
		Tibia	15	Right	Adult	-	Proximal shaft, 2 fragments
		Tibia	55	-	Young juvenile	-	Central shaft
		Tibia	45	Left	Infant	-	Proximal ½
		Tibia	50	-	Infant	-	Central shaft
		Tibia	25	-	Infant	-	Central shaft
		Tibia	25	-	Infant	-	Central shaft
		Fibula	2	Right	Adult	-	Distal epiphysis
		Fibula	2	Right	Adult	Male?	Distal epiphysis, huge
		Fibula	10	-	Adult	-	Shaft fragment
		Fibula	30	-	Infant	-	Shaft fragment
		Fibula	60	-	Infant	-	Shaft fragment, paired with above?
		Ulna	50	-	Infant	-	Distal shaft
		Clavicle	90	Left	Adult	-	Shaft, moderate bone excavation for costoclavicular ligament
		Clavicle	30	Left	Infant	-	Lateral 1/3
		Clavicle	25	Left?	Adult?	-	Lateral shaft
		Sacrum	10	-	-	-	Spinous process fragment
		Sacrum	10	-	-	-	Spinous process fragment
		Calcaneus	30	Left	Adult	-	Superior part
		Pelvis	20	Left	Young juvenile	-	Ischium
		Vertebrae	60	-	Adult	-	Lumbar body with porosity and slight osteophyte formation
		Vertebrae	60	-	Adult	-	T1
		Vertebrae	40	-	Adult	-	Cervical body
		Vertebrae	20	-	-	-	Lumbar spinous process fragment
		Ribs	5-30	-	-	-	5 shaft fragments
		Ribs	5	Left	Adult	-	Head and neck

Context	Context Type	Bones	Percentage of Bone Present	Side	Age	Sex	Other
		Skull	30	-	Juvenile	-	7 cranial fragments
		Skull	1	-	Adult?	-	1 cranial fragment
		Metacarpals	100	Left	Adult	-	2nd metacarpal
		Metacarpal	30	-	Adult	-	Distal 1/3
		Phalanges	100	-	Mature adult?	-	Proximal 1st hand phalanx, eburnation at distal joint = OA
		Phalanges	100	-	Adult	-	Intermediate hand phalanx
		Long bone	-	-	-	-	5 unidentified long bone fragments
		Unidentified	-	-	-	-	-
-	Skeleton 2	Tibia	80	Right	Young juvenile	-	Shaft, part of distal epiphysis
		Tibia	75	Left	Young juvenile	-	shaft, paired with above
		Femur	55	Left	Young juvenile	-	Proximal ½
		Clavicle	55	Left	Young juvenile	-	Medial ½
		Vertebrae	60	-	Young juvenile	-	Body and transverse processes
		Tibia	30	Left	Foetus/neonate	-	Proximal 1/3
		Ribs	25	-	Juvenile	-	2 shaft fragments
		Tibia	40	-	Infant	-	Central shaft fragment
		Carpals	100	Right	Adult	-	Scaphoid
		Phalanges	100	-	Adult	-	Proximal 1st foot phalanx
		Unidentified	-	-	-	-	-
-	Skeleton 4	Metatarsals	100	Left	Adult	-	1st & 2nd metatarsals
		Metatarsals	50	-	Adult	-	Shaft fragment
		Metatarsals	30	-	Adult	-	Distal 1/3
		Phalanges	100	-	Adult	-	1 proximal foot phalanx
		Phalanges	100	-	Adult	-	5 intermediate hand phalanges
		Phalanges	100	-	Adult	-	1 distal hand phalanx
51	Charnel Pit	Femur	90	Left	Adult	Male?	All except head and neck, periostitis at proximal posterior-medial shaft, enthesopathy for gluteus maximus
		Femur	2	-	Adult	-	Distal epiphysis fragment
		Femur	1	-	Adult	-	Head
		Femur	1	-	Adult	-	Greater trochanter
		Femur	70	Right	Infant	-	Central shaft
		Femur	1	-	Adult	-	neck
		Humerus	100	Left	Adult	Female	All, bone excavation for pectoralis major, Supracondyloid process, small head compared to length, 2 fragments
		Humerus	95	Left	Adult	Male	All but distal epiphysis, 2 fragments
		Humerus	75	Left	Adult	-	Distal ¾, 2 fragments
		Humerus	1	-	Adult	-	Head fragment
		Humerus	30	-	Juvenile	-	Shaft fragment

Context	Context Type	Bones	Percentage of Bone Present	Side	Age	Sex	Other
					(young)		
		Clavicle	90	Left	Adult	-	Lateral ¾
		Clavicle	30	Right	Adult	-	Lateral 1/3
		Clavicle	15	Right	Adult	-	Medial third
		Ulna	100	Left	Adult	-	All, 2 fragments
		Ulna	60	-	Infant	-	Shaft
		Radius	90	Left	Adult	-	Distal 3/4, paired with above bone, 2 fragments
		Tibia	15	Left	Adult	-	Proximal epiphysis and shaft fragment, 2 fragments, bone excavation for soleus, periostitis on medial and lateral surfaces
		Tibia	90	Left	Juvenile (young)	-	Distal ¾
		Tibia	90	Right	Juvenile (young)	-	Distal ¾, paired with above, 2 fragments
		Fibula	100	Right	Adult	-	All, 3 fragments
		Fibula	80	Right	Juvenile (young)	-	Shaft
		Fibula	80	Left	Juvenile (young)	-	Shaft, paired with above, 3 fragments
		Fibula	30	-	Adult	-	Shaft fragment
		Fibula	30	-	Adult	-	Shaft fragment
		Fibula	25	-	Adult	-	Shaft fragment
		Patella	100	Left	Adult	-	All
		Sternum	45	-	Adult	-	Proximal ½
		Calcaneus	100	Left	Juvenile (young)	-	All
		Calcaneus	100	Right	Juvenile (young)	-	All, paired with above
		Vertebra	90	-	Juvenile	-	C2
		Vertebra	65	-	Adult	-	C1, 2 fragments
		Vertebra	90	-	Adult	-	Cervical, severe DJD at body
		Vertebra	90	-	Adult	-	1st thoracic, moderate djd at body, 2 fragments
		Vertebra	30	-	Adult	-	Body fragment of lower thoracic or lumbar
		Ribs	2-30	-	Adult	-	14 shaft fragments
		Ribs	95	Left	Adult	-	12th rib
		Ribs	2	-	Adult?	-	Sternal end
		Ribs	5	Right	Adult	-	Head and neck
		Ribs	10	-	Adult	-	First rib head and neck
		Skull	40	-	Juvenile (young)	-	Frontal and parietals, including right orbit
		Maxilla	30	Left	Oma	-	M1, PM2, PM1, C, I2, moderate wear, moderate periodontitis, deh
		Scapula	25	Right	Adult	-	Glenoid, medial border
		Scapula	10	Right	Adult	-	Glenoid
		Scapula	10	Right	Adult	-	Medial border
		Scapula	10	-	Adult	-	Acromion

Context	Context Type	Bones	Percentage of Bone Present	Side	Age	Sex	Other
		Scapula	10	-	Adult	-	Acromion
		Scapula	5	-	Adult	-	Acromion
		Scapula	5	-	Adult	-	Coronoid
		Scapula	5	-	-	-	Blade fragment
		Metacarpals	95	Left	Adult	-	1st to 5th metacarpals
		Metacarpals	100	Right	Adult	-	2nd metacarpal, pair of above
		Metacarpals	100	Right	Adult	-	St metacarpal
		Metacarpals	50	Left	Adult	-	5th proximal half
		Metacarpals	50	-	Adult	-	Distal ½
		Phalanges	100	-	Adult	-	Proximal hand phalanx
		Phalanges	100	-	Adult	-	Intermediate hand phalanx
		Metatarsals	100	Right	Juvenile	-	1st, 2nd, 3rd, 4th metatarsal
		Metatarsals	100	Left	Juvenile	-	1st, 2nd, 4th metatarsals, paired with above
		Pelvis	70	Left	Adult	Male?	9 ilium fragments, including parts of acetabulum
		Pelvis	10	Left	Mature adult	Male	Pubic symphysis, probably part of above
52	Area of Skull 4	Radius	65	Left	Juvenile	-	Distal 2/3
		Ribs	40	Left	Juvenile	-	Shaft fragment
		Vertebrae	50	Left	Juvenile	-	C1
		Vertebrae	100	-	Juvenile	-	2 cervicals
		Vertebrae	40	-	Juvenile	-	Partial cervical
		Mandible	60	Right, centre	4-5	-	Mandible, right deciduous 1st, 2nd molar, canine, 2nd incisor, permanent 1st, 2nd molar crowns, left deciduous canine, first molar
Charnel Pit	Skull 1	Skull	60	-	Juvenile, 4-5	-	L. maxilla, frontal, parietals, parts of occipital, l,. zygomatic, M2, deciduous M1 and M2
Charnel Pit	Skull 2	Skull	75	-	Mature Adult	Female	Occipital, parietals, upper frontal, right temporal, right mandible, mandible edentulous, arachnoid granulations
Charnel Pit	Skull 3	Skull	75	-	Juvenile 4-6	-	Cranium, right zygomatic, maxilla, left mandibular ramus, c1, 1 rib; deciduous canine, M1, M2
Charnel Pit	Skull 4/5 (matched)	Skull	65	-	Young middle adult	Male	Frontal, occipital, parietals, temporals, right zygomatic, maxilla, left premolars and molars, right 3rd molar. Large cavity in left M1
Charnel Pit	Skull 6	Skull	35	-	Young juvenile	-	4 cranial fragments (frontal, parietals)
Charnel Pit	Skull 7/8 (matched)	Skull	70	-	Old middle adult	Male	Frontal, parietals, occipital, temporal, right mastoid, right maxilla, mandible; all mandibular teeth except right M3, right maxillary M1, M2, PM1, PM2, canine, moderate wear, peridontitis, anterior crowding in mandible,

Context	Context Type	Bones	Percentage of Bone Present	Side	Age	Sex	Other
							DEH
Charnel Pit	Skull 7	Skull	35	-	Young juvenile	-	11 cranial fragments (parietals)
Charnel Pit	Skull 9	`Skull	50	-	Juvenile, 3	-	Parietals, occipital, temporals, left maxilla, S1