Old Joiners Workshop, Askham Richard, York

Report on an Archaeological Watching Brief

April 2018

LS Archaeology

Site	Old Joiners Workshop, Main Street, Askham Richard, York, YO23 3PT
Site Code	OJC17
County	North Yorkshire
NGR	SE 53735 47980
Planning Application No	16/02385/FUL
Development	A single storey extension to an existing residential annex to form one dwelling with new vehicular access.
Excavation	L.Signorelli J. Lyall (Geophiz) Katie Keefe (York Osteoarchaeology)
Post Excavation	D. Signorelli L.Signorelli York Osteoarchaeology C.Cumberpatch (Post Roman Ceramics) R.Broadley (Glass) Nicola Rodgers(Metal) J.Richardson (WYAS) E.Timms (Editing)
Month of Issue	April 2018
Site Dates	6th,9th and 10th of October 2017
Client	Mr Richard Warriner

Summary

This report summarises the findings of an archaeological watching brief carried out during ground reduction works associated with the development at the Old Joiners Workshop, Main Street, Askham Richard, York. An archaeological condition was attached to this site due to the potential for archaeological deposits associated with the medieval village and post medieval activity being present.

During groundworks a significant amount of human remains were encountered- mostly being disarticulated with three articulated human burials being present. The articulated burials were laid in a supine position and orientated west to east as is common with Christian burials.

Later medieval (11th to 15th century) quarrying is likely to have disturbed this earlier burial ground, which is located outside the parameters of the existing churchyard and church (St Mary's).

There is potential for further research beyond this initial evaluation of results. To support this and possible AMS dating, an archive shall be deposited at the Yorkshire Museum.

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INTRODUCTION

This report summarises the results of an archaeological watching brief carried out during ground reduction works associated with the development at the Old Joiners Workshop, Askham Richard, York (Figure 1). This development consisted of a single storey extension to an existing residential annex to form one dwelling with new vehicular access (Figure 2).

Planning Application 16/02385/FUL was granted by the City of York Council subject to a condition listed within the Town and Country Planning Act 1990.

'*No work shall commence on site until the applicant has secured the implementation of a programme of archaeological work (a watching brief on all ground works by an approved archaeological unit) in accordance with a specification supplied by the Local Planning Authority. This programme and the archaeological unit shall be approved in writing by the Local Planning Authority before development commences.*'

Reason: The site lies to the rear of the building line within the original medieval village of Askham Richard. Askham Richard is first documented in the Domesday Book in 1086 and has a pre-Conquest foundation. It is possible that excavations for foundations and service connections related to this development may reveal or disturb archaeological features related to the village and of the post-medieval use of the site. The development will affect important archaeological deposits which must be recorded during the construction programme. The information is sought prior to commencement to ensure that the investigation is initiated at an appropriate point in the development procedure.

A Written Scheme of Investigation (L.S Archaeology, 2017) was submitted and agreed prior to the commencement of grounds works, which took place during early October 2017.

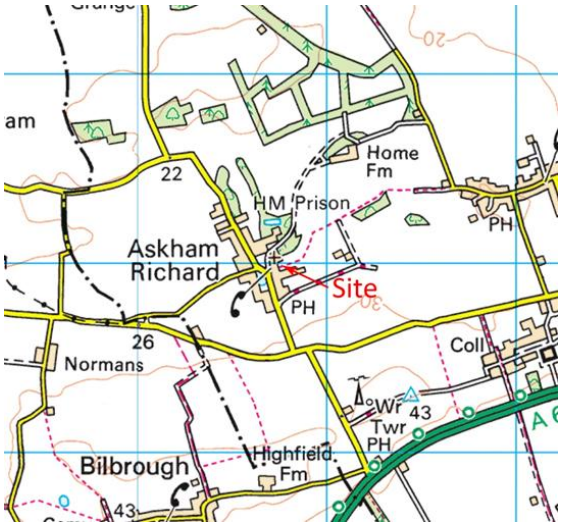


Figure 1: Street Map of Askham Richard with the site location pointed in red

SITE LOCATION AND GEOLOGY

The property to be developed, the Old Joiners Shop, is located to the rear of the Old Joiners Workshop, and is sandwiched between Prospect Cottage (to the north), and by the Rose and Crown public house (to the south).

To the east-northeast, the property backs onto mixed foliage and beyond it lies an extensive area laid to grass (Figure 3). To the north of the property, between Prospect Cottage and the Old Joiners Workshop, running on a northeast direction, a public footpath connects Askham Richard with Askham Bryan.

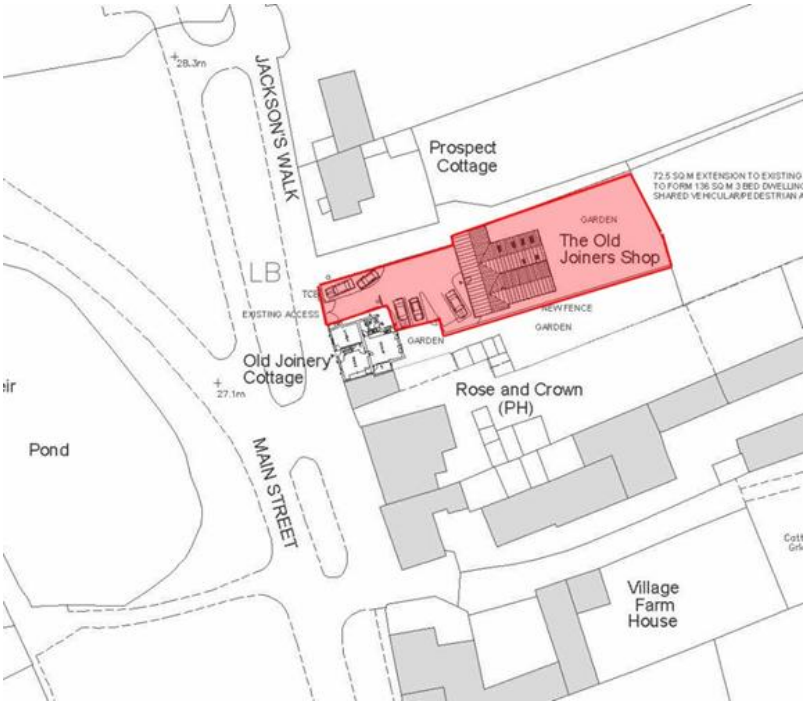


Figure 2: Site plan of the Old Joiners Workshop with the proposed

Figure 3: Physical plan of the site, from Google earth

The bedrock geology consists of Sherwood sandstone with overlying Vale of York superficial deposits consisting of sand and gravel (Figure 4). Both Askham Richard and Askham Bryan have similar sand and gravel geology with a band of superficial clay dividing the historic cores of both villages, to the east and west respectively.

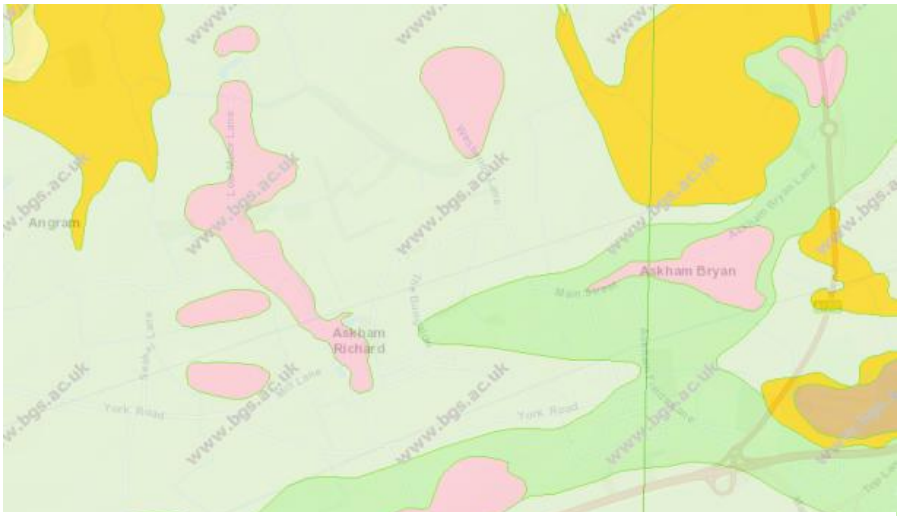


Figure 4: Askham Richard and Askham Bryon Geology

Archaeological deposits from the Anglo Saxon period can survive well in this type of geology for two reasons:

- Anglo Saxon Communities favoured the ease of building their timber structures upon sand and gravel compared to more dense superficial deposits.
- Good preservation of archaeological features within sand and gravel occurs due to favourable drainage conditions (Arnold, 2005).

ARCHAEOLOGICAL AND HISTORICAL BACKGROUND

Prehistoric and Roman spot finds (a quernstone) and a Grade II Roman Coffin (associated with the Askham Richard's Church-St Mary's) are present in Askham Richard. Earlier settlements are likely to have been existed, especially during the Romano British Period. Askham Richard has two Roman roads within its proximity (Margary, 1955):

- Margary 8a - Roman road from York to Aldborough to the north
- Margary 28c - Roman road from Tadcaster to York to the south

The likelihood of archaeological deposits associated with pre medieval periods is possible however medieval and post medieval evidence is more likely.

Etymological evidence suggests that the name Askham Richard is originally derived from the 'ascha' meaning an enclosure of ash trees. Askham Bryon, located approximately 1km to the east of Askham Richard also shares this name and association with the ash tree. The word 'ascha' has Scandinavian origins; the favoured ash tree, which as a wood is strong and elastic and as a fuel burns well with intense heat (Arnold, 2005).

Little Askham (Richard) and Great Askham (Bryon) were connected by one lordship during the Saxon times. The Domesday records indicate that it was owned by Edwin Earl of Mercia whereby after Edwin's death during the Norman Conquest it was forfeited to William the

Conqueror amongst other great swathes of land (Sheahan and Whellan, 1855). During the 13th century 'Little' and 'Great' Askham's were formally divided:

- Askham Richard - Richard from Richard the 1st Earl of Cornwall
- Askham Bryon - Bryon from Bryon Fitz Alan, Guardian of Scotland

The medieval origins of the linear village of Askham Richard are still visible. The layout of the properties and croft and tofts associated with prior medieval activity remain largely intact in some parts with ridge and furrow field systems located to the east of the development site.

The village has eight listed buildings. The majority of these buildings are mid 18th century, mostly Grade II, with the earliest structural origins being embedded within the renovated St Mary's Church. This church has 12th century origins, though earlier features such as a Saxon doorway are present. It has two monuments: a windmill with medieval origins and the parish records.

The 1854 Ordnance Survey Map of Askham Richard (Figure 5) identifies notable features such as Askham Richard Hall and associated ponds and formal gardens, the weir, poor houses, St Mary's Church, Methodist Chapel, Pound and a tannery. A rectangular square earthwork is located to the east of St Mary's Church however, no evidence of its existence was uncovered during this preliminary investigation.

In 1975 the unique and unspoilt characteristics of the village was acknowledged and Askham Richard became a conservation area.

Figure 5: 1854, 1st Edition Ordnance Survey Map

POTENTIAL ARCHAEOLOGICAL DEPOSITS

Prior archaeological investigations within Askham Richard are scant. In 2003, AOC carried out a buildings recording on a post- medieval barn at Prospect Farm and apart from a spot find of a quern stone of possible roman or prehistoric origins, no other data regarding prior ground works was

encountered.

Askham Bryon and Askham Richards had strong historical connections and similar geology. Due to this, evidence of archaeological deposit depths, reported during archaeological investigations at Askham Bryon, were referred to.

Archaeological data was extracted from two sources of works carried out in Askham Richards:

- 2004 - 2006 Northern Archaeological Associates and works associated with the installation of a wastewater pump.
- 2016 Onsite Archaeology at Egton cottage on Main Street.

Results revealed:

- Post medieval deposits were encountered underneath topsoil at a depth of 0.30m (NAA 2006)
- At 0.47m late 19th century disturbed ground related to structural activity (OS 2016)

It was, based upon the above evidence, suggested (LS Archaeology, 2017) that archaeological deposits from the medieval and post- medieval period might be present at depths of 0.30m.

MITIGATION STRATEGY

STRIP MAP AND RECORD

The impact of the development on any potential archaeological assets was mitigated through a programme of archaeological investigation. Given the small size of the building plot, the most suitable intervention was to fully strip the site, then map and record any potential archaeological assets. The site was stripped in spits of 0.10m until the first phase of archaeology was encountered, this being context (2) at a depth ranging across site from 0.36-0.56m (Plate 1).

Excavation to depth of 0.60m was required to create the foundations for the extension to the Old Joiner's Shop (Figure 6).

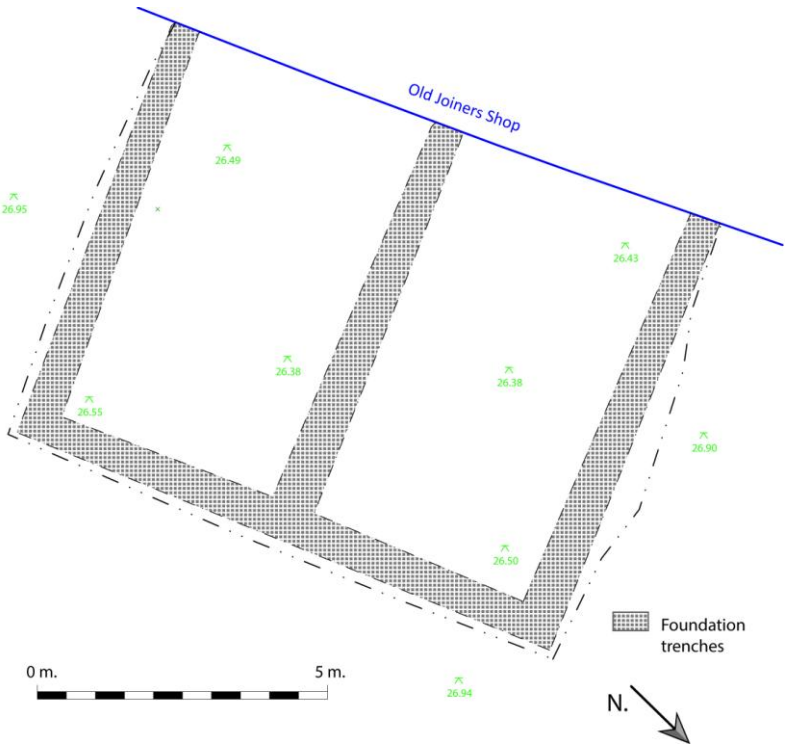


Figure 6: Plan outlining the location of the foundation trenches and associated levels

The supervising archaeologist was Luigi Signorelli from LS Archaeology.

The guidelines for archaeological excavation issued by the *Chartered Institute for Archaeologists* (2014) were adhered to throughout the investigation.

Plate 1: Cleaning back context (2) to expose areas of disarticulated and articulated human remains.

METHODOLOGY

The guidelines for archaeological excavation, issued by the *Chartered Institute for Archaeologists* (2014), were adhered to throughout.

The strip map and recording of the site was fulfilled in accordance with the following criteria: all ground works that intrude below the level of the topsoil (or other 'modern' made ground layers) have been monitored; all necessary archaeological recording has been completed.

A back-acting mechanical excavator fitted with a toothless bucket was used for all excavations, to assist with the identification of archaeology. The ground consisted of a grass garden.

Human remains were not expected but were uncovered. The coroner was informed (Ministry of Justice) and further groundworks were postponed until an excavation licence was issued. Malin Holst from York Osteology was contacted to discuss potential recording strategies with regard to the extreme disturbance of the burials as well as supporting with the retrieval and subsequent evaluation of the remains.

A standard electronic single context recording system was used to keep a document record of all archaeology encountered.

All of the archaeological features were sample excavated to the following criteria: ditches 5%; pits 50%; post-holes 100%; burials 100%; linear structures (walls etc.) 5%.

All archaeological features were drawn and surveyed in plan.

All archaeological features were photographed as appropriate using a minimum of 10-megapixel digital colour camera.

All archaeological finds were retained and these were evaluated by Chris Cumberpatch (Ceramics) Rose Broadly (Glass) and Nicky Rogers (Metal/Small Finds).

Animal Bone was retained and evaluated by Jane Richardson.

Due to substantial ground disturbance no samples (General Biological Analysis) were retained.

On completion of work, all records and photographs were catalogued, in accordance with the *Institute for Archaeologists* guidance (2008).

No finds identified as treasure trove were encountered.

RESULTS

Context	Type	Description
1	Deposit	Top soil/ garden surface Contained the base of an 18th-19th century green utility bottle. Pottery dates deposit to the EC20th. George V (1926) coin. 1 fragment of roof tile.
2	Deposit	Sub soil Soil accumulated between Natural and Top/Soil Associated with Features [31] and [32]. Disarticulated bones found within it. Contained 17 skull, rib, phalanx, humerus, tibia, femur, os-coxa and sacrum fragments. Includes local pottery such as Brandsby, Beverley, York glazed ware MC11th-C14th with 3 out of 18 fragments being post medieval in date. 21 bone fragments from cattle, pig, sheep and a partial dog skeleton. 4 white broken clay pipe stems.
3	Deposit	Natural Sand and gravel
4	Deposit	Concentration of disarticulated human bones: 71 ulna, vertebra, skull, humerus, metatarsal, phalanx, tibia, rib, scapula, sacrum, os-coxa and zygoma fragments. 4 cattle bone fragments.
5	Deposit	Area of concentration of disarticulated human bones: 56 skull, os-coxa, vertebrae, rib, talus, scapula, metacarpal, metatarsal, radius, fibula, ulna and femur fragments. 9 bone fragments from cattle, sheep and a partial dog skeleton.
6	Deposit	Area of concentration of disarticulated human bones: 7 skull, femur and rib fragments.
7	Deposit	Area of concentration of disarticulated human bones: 37 tibia, fibula, calcaneus, metatarsal, humerus, os-coxa, rib, phalanx, femur, tibia, vertebra and metacarpal fragments. 8 bone fragments from pig and cattle.
8	Deposit	Area of concentration of disarticulated human bones: 10 skull, rib, phalanx, ulna and radius fragments. 2 cattle bone fragments.
9	Deposit	Area of concentration of disarticulated human bones: 27 skull, tibia, fibula, femur, os-coxa, vertebra, scapula, metacarpal, humerus, phalanx and rib fragments. 5 cattle bone fragments.
10	Deposit	Area of concentration of disarticulated human bones: 16 skull, rib, ulna, sphenoid, humerus, scapula, radius, phalanx and os-coxa fragments. 1 cattle bone fragment.
11	Deposit	Area of concentration of disarticulated human bones: 6 skull, fibula, ulna, humerus, femur fragments.
12	Deposit	Area of concentration of disarticulated human bones: 8 femur, ilium, rib, skull and humerus fragments.
13	Deposit	Area of concentration of disarticulated human bones: 33 metatarsal, rib, humerus, radius, ulna, femur, tibia, vertebra, scapula, skull and os-coxa fragments. 1 cattle bone fragment.

Context	Type	Description
14	Deposit	Area of concentration of disarticulated human bones: 7 rib, skull, os-coxa, femur and radius fragments.
15	Deposit	Area of concentration of disarticulated human bones: 3 femur, fibula and humerus fragments. 121 bones forming a pig skeleton with 2 chicken and cattle bone fragments.
16	Deposit	Area of concentration of disarticulated human bones: 9 humerus, skull, vertebra, metatarsal, metacarpal and fibula fragments. 2 cattle bone fragments.
17	Skeleton	Articulated human remains with no visible cut: 90% complete, age 46+ male of 1.86m stature with signs of degenerative joint changes on hips and knees, Schmorl's Nodes and healed rib fractures. 2 bone fragments from cattle and pig.
18	Deposit	Area of concentration of disarticulated human bones: 14 skull, calcaneus, talus, phalanx, hamate, metatarsal, femur and rib fragments.
19	Skeleton	Articulated human remains with no visible cut: 37 metacarpal, phalanx, humerus, radius, femur, ulna, rib, skull, scapula, vertebra, os-coxa, metatarsal and tibia fragments. 50% complete, age 46+ male of 1.65m stature with signs of degenerative joint changes on hips and knees. 1 gnawed sheep bone and 11 neonatal cat bones.
20	Skeleton	Articulated human remains with no visible cut: 14 sacrum, ulna, radius, skull, tibia, vertebra, rib, metacarpal, scapula, humerus and os-coxa fragments. 40% complete, age 46+ female of 1.65m stature. One iron nail with a flat circular head. One cattle bone fragment.
21	Deposit	Area of concentration of disarticulated human bones: 10 tibia, fibula, skull, rib, ulna and os-coxa fragments.
22	Deposit	Area of concentration of disarticulated human bones: 50 skull, metatarsal, tarsal, femur, scapula, vertebra, radius, ulna, fibula, ribs, os-coxa and clavicle fragments. 1 pig bone fragment.
23	Fill	Brown silty sand fill of large quarry pit [32] similar to contexts (25) and (26). Contained: 39 rib, metatarsal, phalanx, sternum, os-coxa, vertebra, skull, femur, maxilla, clavicle, ulna, patella, radius, humerus and scapula fragments. Includes local pottery such as Beverley, Yorkshire gritty ware MC11th-C13th with 1 out of 4 fragments being post medieval in date. 6 bone fragments from cattle, pig and chicken.
24	Fill	Brown silty sand fill of large quarry pit [34] similar to contexts (25) and (28). Contained: 85 femur, tibia, fibula, calcaneus, humerus, os-coxa, sacrum, clavicle, ulna, radius, vertebra, rib, metatarsal, skull and metacarpal fragments. Includes local pottery such as Brandsby, York glazed ware, Yorkshire gritty ware MC11th-C15th with 1 out of 18 fragments being post medieval in date. Lead Alloy and Iron sub-rectangular plate, one edge distorted, with iron nail in each corner along other edge. 3 cattle bone fragments. 1 piece CBM
25	Fill	Brown silty sand fill of large quarry pit [32] similar to contexts (23) and (26). Contained: 91 tibia, femur, sacrum, rib, vertebra, ulna, radius, humerus, metacarpal, os-coxa, clavicle and scapula fragments. Includes local pottery such as Brandsby ware E/MC13th-C14th with both fragments being medieval in date. 1 cattle bone fragment.
26	Fill	Brown silty sand fill of large quarry pit [32] similar to contexts (25) and (23). Contained: 12 tibia, femur, humerus, rib, fibula and skull fragments. An iron strap hinge. 2 bone fragments from pig and cattle.
27	Fill	Brown silty sand fill of large quarry pit [34] similar to contexts (25) and (26).
28	Fill	Brown silty sand fill of large quarry pit [34] similar to contexts (24) and (27).
29	Deposit	20th century rubble deposit associated with groundworks [33] related to the Old Joiners Shop feature.
30	Deposit	20th century rubble and clay deposits of feature [31]. Includes local pottery such as Beverley, York glazed type, Yorkshire gritty ware MC11th-C13th with 3 out of 9 fragments being post medieval in date. Contained the shoulder and part base of an 18th century green utility bottle and two fragments of pale olive green late post medieval window. 1 sheep/goat bone fragment.

Context	Type	Description
31	Cut	20th century rubble deposit associated with groundworks related to the Old Joiners Shop feature. Filled by context (30).
32	Cut	Medieval /Post- medieval large feature interpreted as possible quarry pit. Filled by contexts (23), (25) and (26).
33	Cut	Large feature associated with groundworks related to the Old Joiners Shop. Filled by context (29).
34	Cut	Medieval /Post medieval large feature interpreted as possible quarry pit. Fill by contexts (24), (27) and 28).
35	Cut	21st century drain and associated manhole

Table 1: Context Index

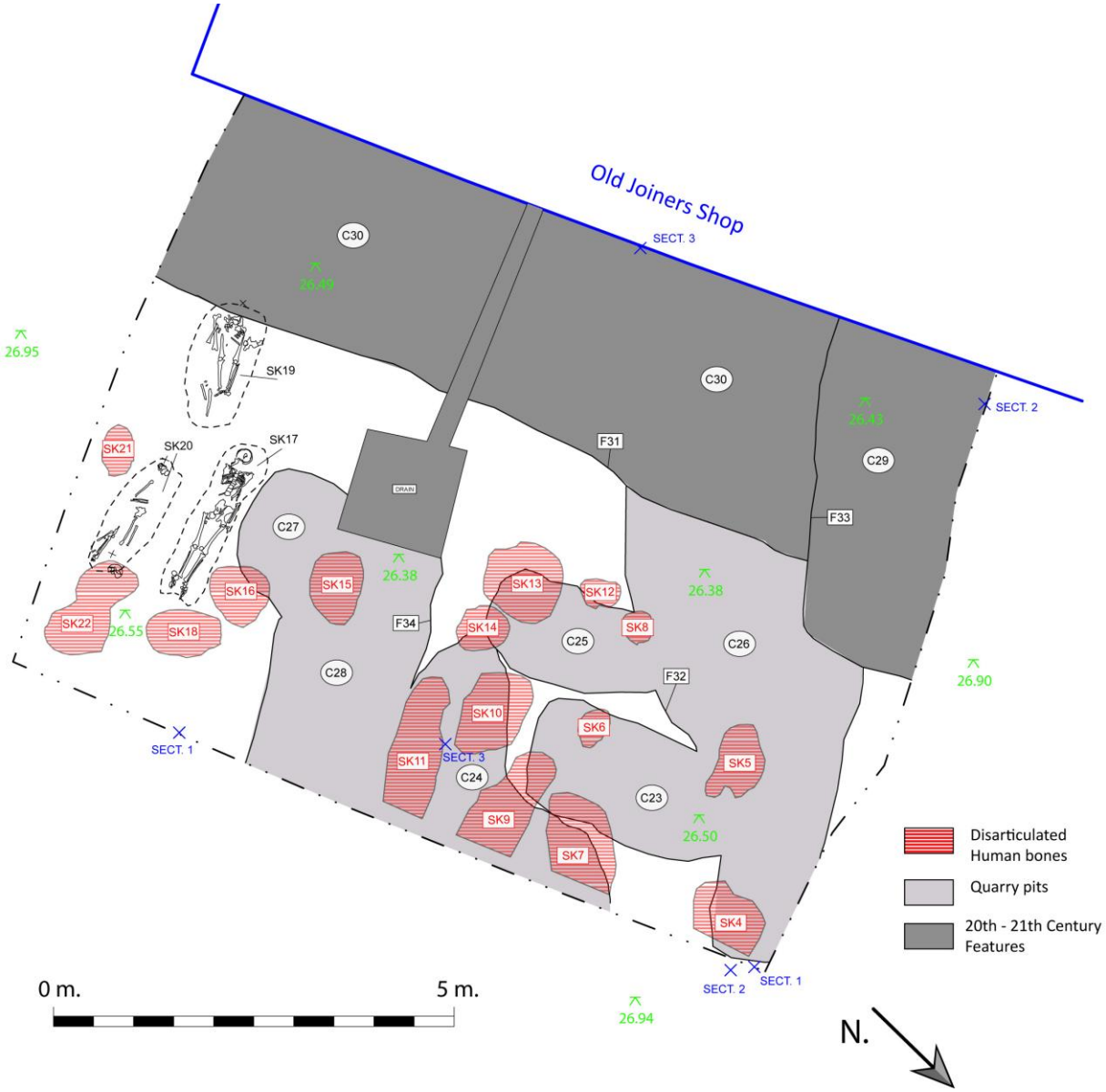


Figure 7: Plan of the archaeology on site

SUMMARY

The extension to the building occupied an area measuring 10.50m in length and 7.50m in width, and required ground reduction to 0.50m in depth. The removal of the top soil (Context 1) revealed the presence of 23 archaeological features (Plate 2 and Table 2):

- 3 articulated burials (Contexts 17, 19 and 20)
- 16 contexts identified with disarticulated human remains (Contexts 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 18, 21 and 22)
- 2 quarry pits [Features 32 and 34]
- 2 modern features related to the construction of the Old Joiners Workshop [Features 31 and 33]
- A 20th century manhole and associated drain were recorded by plan.

Plate 2: Site post stripping with the amorphous outlines of both quarry pits [32 and 34].

SITE STRATIGRAPHY

Context (1) : **Top Soil/ Garden Surface** sealed all contexts below
Feature [31] and context (30) Feature [33] and context (29): 20th-21st century ground work activity associated with the Old Joiners Shop Both these large contexts were observed positioned adjacent to the eastern elevation of the Old Joiners Shop. Feature [31] cut quarry pit [32] to the north and to the south Skeleton (19). At a later stage feature [33] cut [31] and quarry pit [32]. The depths of these features were observed only to the level required for the excavation of the foundation trenches. This was 0.50m, however, these modern features are likely to have surpassed this depth.
Context (2): Subsoil **Disarticulated human remains (Contexts 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 18, 21 and 22)** A subsoil deposit was observed to the north at a depth of 0.40m under context (1)- the top soil/garden surface. This subsoil displayed disturbance visible as extensive bioturbulance (hedge and tree root) and disarticulated human remains. This context sealed the earlier quarry pits [32 and 34] and the three articulated Skeletons (17), (19) and (20). It is likely that context (2) could have resulted from later 20th-21st century groundworks [31 and 33] or earlier foundation works undertaken during the construction of the Old Joiners Shop circa 19th century. This work may have disturbed other articulated burials within the vicinity of the Old Joiners Shop. Soil may have been redistributed during landscaping/building works creating the disarticulated skeletal deposits as seen in context (2).
Feature [32] contexts (23, 25, 26) Feature [34] contexts (24, 27, 28) Medieval Quarry Pits The larger of the quarry pits [32] occupied most of the northern aspect of the site and was similar to quarry pit [34] in being amorphous in shape. Both quarry pits [32 and 34] were sealed by subsoil (2) and [32] was cut by features [31] and [33], whereas feature [34] was cut by a later 20th century drain. Both quarry pits [32] and [34] contained a substantial amount of disarticulated human remains: 142 and 85 fragments respectively. The quarry pits were cut into the natural sand and gravel which was present at a depth of 0.50-0.60m. Both pits backfill contained domestic animal bone such as pig, sheep and cattle, pottery sherds indicated locally produced domestic ware (11th-15th centuries) and a large amount of disarticulated human remains. It is possible that these pits would have originally cut through earlier articulated burials.
Articulated Skeletons (17), (19) and (20) Three articulated skeletons were located to the south of the site. All three skeletons were aligned approximately west to east and laid in an extended supine position. All were observed at a depth of 0.40m under context 1 and partially under context (2). Disarticulated deposits of human remains (Skeletons 16, 18, 21, 22) were in close proximity to Skeletons (17), (19) and (20). The articulated skeletons appear to have avoided being disturbed by the medieval quarry pit [32] and the later 20th-21st century groundworks [31]. Context (2) was partially spread above these undisturbed burials.
Context (3) Natural sand and gravel The natural consisted of light brown loose sandy gravel and was observed at a depth of 0.50-0.60m.

Table 2: Site Stratigraphy

More context data is in Appendix 6.

Articulated Burials

The earliest features on site were three human graves (Skeletons 17, 19 and 20) (Figure 5). All three inhumations lay in an extended supine position and were similarly aligned. Their alignment, although not exactly accurate, is more or less west to east, with the head towards the west and the feet to the east as is common with Christian burial. This religious custom was adopted and became widespread after the 4th century. Excavations revealed no evidence of a coffin/shroud or funerary material/grave goods.

Out of the three burials, two were identified as being mature adult and male (SK17 and SK19) with the third skeleton (SK20) being that of a mature adult female. Holst, M. and Keefe, K. of York Osteoarchaeology undertook a thorough analysis and discussion regarding all of the human remains found on site and their results are reported in Appendix 1.

Two (SK 17 and SK20) of the three articulated skeletons appear to have remained undisturbed due to their position being outside the parameters of ground disturbance associated with either quarrying or groundworks associated with the Old Joiners Shop (Figure 7). Unfortunately, one of the mature adult males, skeleton (19) (Figure 8) was truncated at the pelvis during 21st century activity relating to groundworks associated with the Old Joiners Shop [Feature 31].

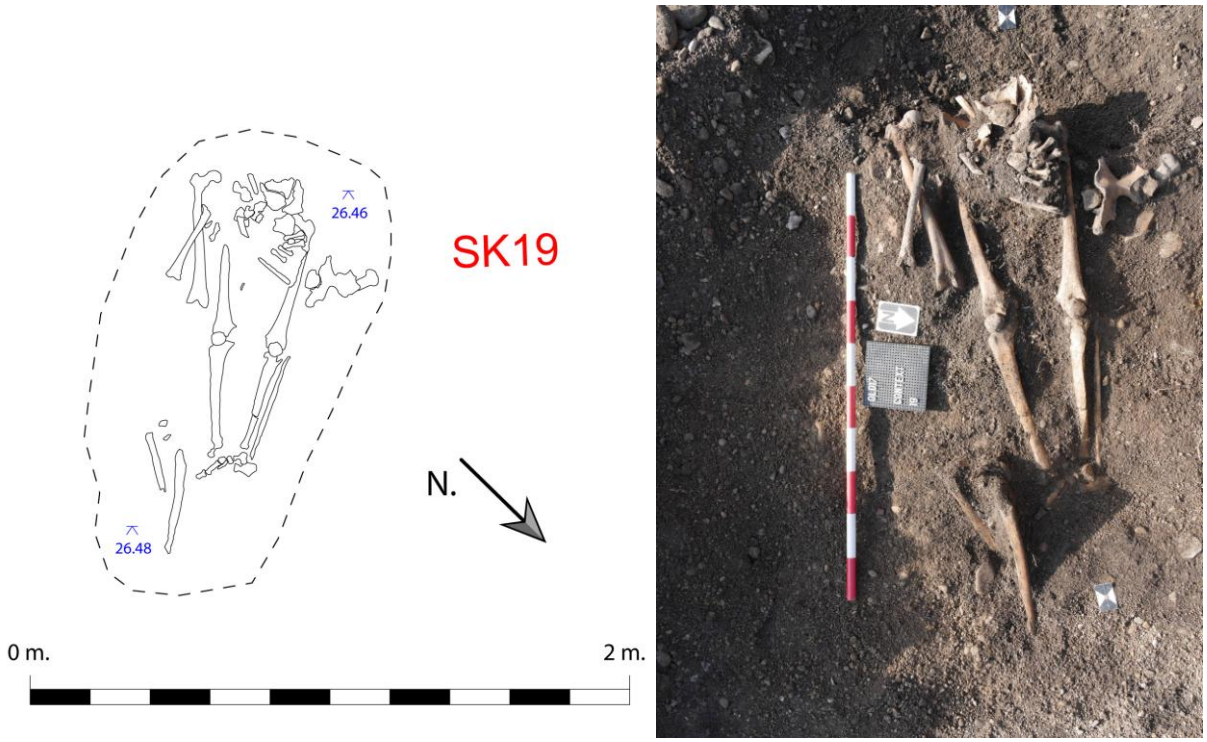


Figure 8: Adult male skeleton [19]

Skeleton (19) was 50% complete and identified as a mature (46+ years) male of 1.65m in stature with some evidence of degenerative joint changes in the hips and knees (Figure 8). The remains of a newborn kitten were found within the pelvic region of skeleton (19). Unusually, the kitten is most likely to have been deliberately buried with the adult (Richardson, J. 2018 Appendix 5).

Skeleton (20) was only 40% complete and identified as a mature (46+years) female of 1.65m in stature (Figure 9). Skeleton (20) consisted mostly of the lower limbs with other disarticulated remains within proximity.

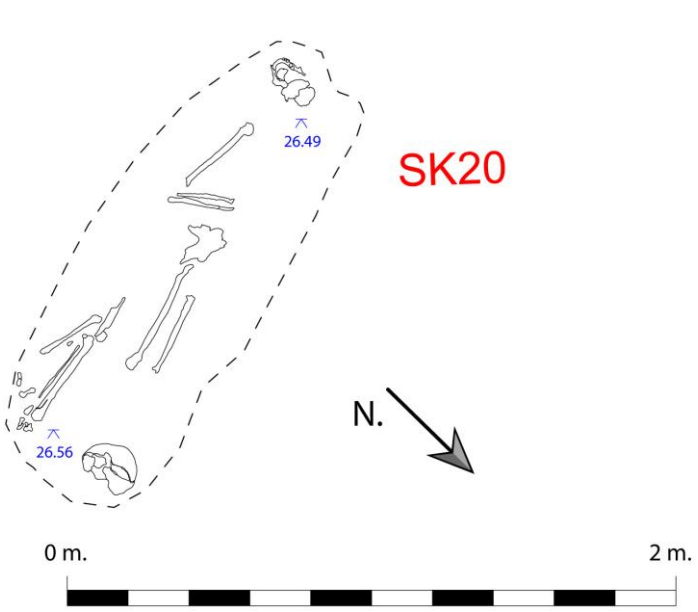


Figure 9: Adult female skeleton [20]

Skeleton (17) was the best-preserved being 90% complete and identified as a mature (46+ years) male of 1.86m in stature with some evidence of degenerative joint changes, arthritis, Schmorl's Nodes and healed rib fractures (Figure 10).

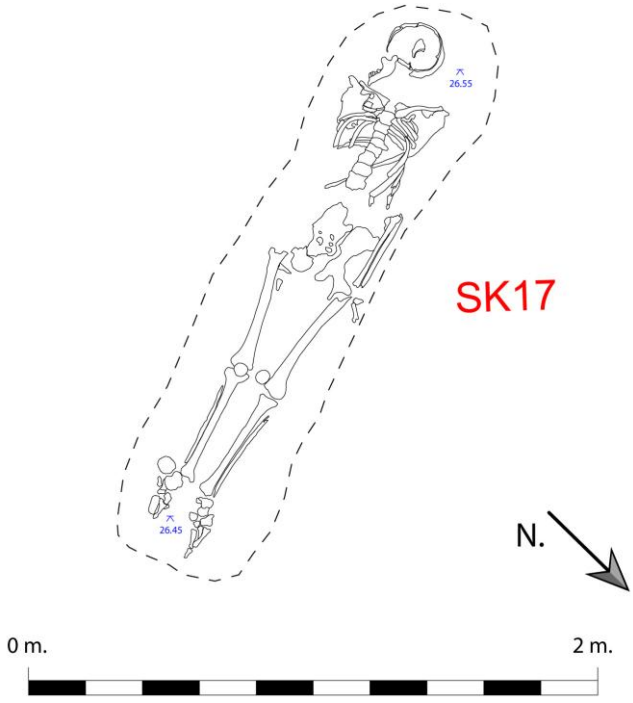


Figure 10: Articulated skeleton [17]

All three articulated skeletons had disarticulated remains within close proximity due to the subsequent spreading of context (2) (Table 2)

Disarticulated Human bones

A further sixteen concentrated areas of disarticulated human remains (SK 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 18, 21 and 22) were observed across the whole of the eastern half of the site. Areas of condensed human bone were numbered accordingly and recorded by survey to try to support analysis during the post excavation stage. A total of 1097 bone fragments were collected.

The disarticulated bone appears to have formed during two phases of groundworks:

1. 19th-21st century groundworks and landscaping associated with the original construction of the Old Joiners Shop and subsequent later adaptations.

2. Medieval activity related to quarrying.

Twenty-three individuals where identified among the assemblage: 18 adults, 3 juveniles, 1 adolescent and 1 infant. Out of these combined assemblages, it was possible to ascertain that 4 were male and 2 female (Holst and Keefe 2018).

Plate 3: Image of the site showing the position of some of the more visible disarticulated human remains (SK4, 6, 15, 16 and 21) and two of the articulated human remains (SK19 and SK20).

Approximately one quarter of all the disarticulated human bone was found within the brown silty sand backfill of the two large quarry pits [Features 32 and 34], the remaining disarticulated human bones were found within the subsoil (Context 2).

The finding of all these disarticulated skeletal human remains, and the three articulated burials, seem to suggests that at a certain point on time (Pre to post Norman conquest), the area surrounding the Old Joiner's Cottage could have been the location of a cemetery.

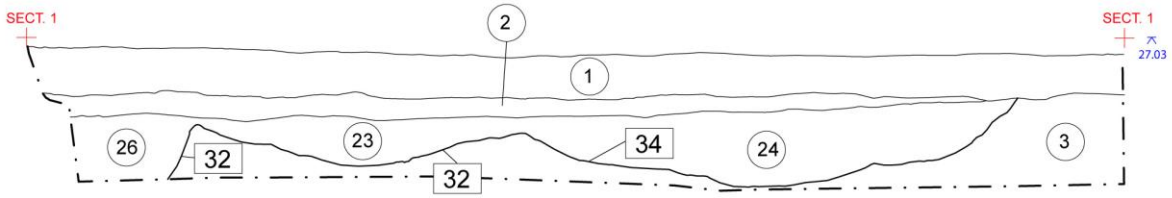
Unfortunately, due to the limited excavated area the full extent of the putative burial ground is unknown.

Quarry Pits

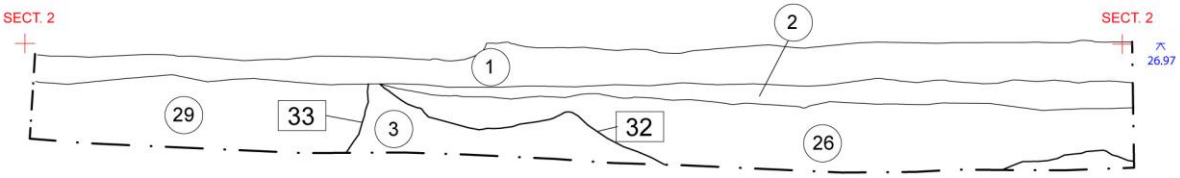
Two large amorphous features [32 and 34] were located towards the northeast and northwest part of the site and extended beyond the north and northeast excavation limits.

These quarry pits are irregular in shape and have undulating edges, as would be expected when gravel or sand is excavated from the ground for building purposes.

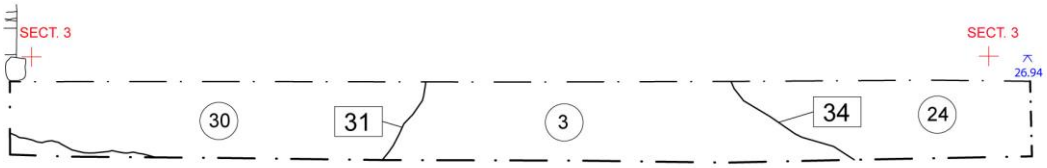
Plate 4: West-facing section Quarry pits [32 and 34].



OLD 17 West facing section Features [32 and 34] Drawing N. 1



OLD 17 South facing section Features [32 and 33] Drawing N. 2



OLD 17 South facing section Features [31 and 34] Drawing N. 3

Figure 11: Section drawings across the quarry pits [Features 32 and 34]

The quarry pits were cut into the natural sand and gravel which was present at a depth of 0.50-0.60m. Both quarry pits [Features 32 and 34] were excavated to a maximum depth of 0.50m and appeared to have been backfilled with a similar single firm brown silty sand and gravel deposit (Contexts 23, 24, 25,26,27 and 28). The backfill contained domestic animal bone such as pig, sheep and cattle; pottery sherds indicated an assemblage of 11th to 15th century pottery, locally produced and associated with domestic activity (C. G. Cumberpatch, 2017, Appendix 2). A large amount of disarticulated human remains dominated the backfill of both quarry pits. It is probable that these pits would have originally cut through earlier articulated burials.

Modern features

Feature [31] (Figure 7) located adjacent to the north wall of the Cottage was filled by a very dark silty sand material (Context 30) and contained sherds of pottery dating from the 11th - 14th and to the 18th - 20th centuries. Glass fragments identified as utility bottles and windowpanes were present within this fill (Context 30) (R.Broadley, 2017, Appendix 3). The dates indicated by the artefacts and the location of Feature [31], suggest that it is very likely that this feature relates to the construction of the Old Joiners Workshop.

Towards the northwest end of the site was feature [33] (not excavated and recorded from section). It was ovate in plan and extended beyond the excavation limits. This feature cut through feature [31] and was filled with pale brown sand mixed with ceramic building material and mortar (Context 29). This was one of the latest features on site.

The most recent feature on site was a 20th century service drain and related square manhole. The drain runs from the Old Joiners Workshop on an east alignment and connects to the manhole, located at the centre of the site (Figure 7).

DISCUSSION AND CONCLUSION

The ground works at the Old Joiners Workshop revealed an unexpected amount of human remains. A minimum of 23 individuals could be identified, including eighteen adults, three juveniles, one adolescent and one infant (Holst and Keefe, 2018).

Generally, the assemblage revealed that this population had an arduous life as seen in degenerative changes to hip and knee bones and by the presence of Schmorl's Nodes (indicative of wear and tear and common in the spine). High levels of trauma were observed including one example of sharp force trauma identified on a partial cranium (Holst and Keefe, 2018).

One of the articulated skeletons (17) was at least 6 feet in height, which is unusually tall for populations at this time (Holst and Keefe, 2018). The height of populations can be used to infer ethno cultural groups, however the sample size and the lack of articulated skeletons within this assemblage may not justify drawing such conclusions.

Dental analysis indicated that some degree of mouth hygiene was attempted. Indicators of childhood stress, hypoplasia (lines that form on the teeth and can be caused by malnutrition and illness) were mostly observed on the deceased juveniles rather than on adults. This suggests that the children within the assemblage may have not been able to recover to live to adult hood and or experienced long periods of hardship (Holst and Keefe, 2018).

The site yielding this assemblage of human remains is located a mere 74 metres south of St Mary's Church and is located outside any known burial ground; the discovery of articulated and disarticulated human remains at this site is of great interest due to its prior unknown status. No grave goods or funerary ware such as coffins or shrouds were found associated with the burials, making it difficult to date the assemblage. One iron nail was present within context (20) (disarticulated human remains) and may have originated from a coffin, although the design of the nail is not, in this case, function specific (Rogers, 2017).

The church of St Mary's contains early architectural features: an Anglo-Saxon doorway and funerary artefacts such as a Roman coffin are situated within the churchyard. The presence of the doorway suggests that there was an Anglo- Saxon community, with a church, residing at Askham Richard.

The three articulated skeletons, by way of their orientation and supine position, indicate Christian burial. This trend in funerary practice generally came into use after the 4th century. It is not possible to state if the articulated burials have revealed the location of an earlier burial ground or if these burials lay outwith the original consecrated land for alternative reasons.

Domestic quarrying occurred on site sometime between the 11th-15th century, causing articulated burials to become disarticulated. The quarry pits contained ceramic evidence suggesting that these pits were backfilled after the 15th century.

Further disturbance to burials was caused during 19th-21st century groundwork's associated with the construction and subsequent maintenance of the Old Joiners Workshop.

The discovery of these remains offers an opportunity for further research, most specifically for AMS (Accelerated Mass Spectrometry) dating. If some of the remains could be dated, it would then be possible to place this discovery into a more specific archaeological and historical period. From the current evidence, it could be assumed, that these remains date from sometime between the 4th-11th centuries.

ARCHIVE

The site archive including all material retrieved from site, the digital and paper record including records, plans and photographs and artefacts are the property of the client Mr. R. Warriner. LS Archaeology shall retain copyright of the Archaeological Watching Brief Report.

A copy of this report shall be uploaded to OASIS (Online Access to the Index of Archaeological Investigation) for inclusion on the online digital archive ADS (Archaeological Data Services).

An archive is to be deposited at the Yorkshire Museum. This is to support future ADS testing on some of the human remains. The archive shall include:

- A hard copy of the report
- The digital archive
- Skelton (17) and Context (7)

All other human remains are to be interred within the grounds of the Old Joiners Workshop, Askham Richard.

BIBLIOGRAPHY

AOC, (2003); Prospect Farm, Askham Richard: Historic Building Recording

Arnold, C.J (2005); An Archaeology of the Early Anglo Saxon Kingdoms

Broadley, R (2017); The Glass from the Old Joiners Workshop Askham Richard.

CIfA, (2014); Standard and Guidance for an Archaeological Watching Brief

CIfA, (2014); Standard and Guidance Appendices

CIfA, (2014); Code of Conduct

Cumberpatch, C.J (2017); The Medieval and Later Pottery from the Old Joiners Workshop Askham Richard.

Holst, M and Keefe, K (2018); The Osteological Analysis (Old Joiners Workshop, Askham Richards).

Margary, I (1955); The Roman Roads of Britain

NAA, (2004); Cultural Heritage Appraisal: Proposed Waste Water Pumping Station Askham Bryan, York. *Northern Archaeological Associates*

NAA, (2006); Archaeological Monitoring: Waste Water Pumping Station Askham Bryan, York. *Northern Archaeological Associates*

Richardson, J (2018); The Animal Bones from the Old Joiners Workshop Askham Richard.

Rogers, N (2017); Assessment of Small Finds from the Old Joiners Workshop Askham Richard.

Sheahan, J.J and Whellan,(1855); History and Topography of the City of York; The Ainsty Wapentake; and the East Riding of Yorkshire; Embracing a General Review of the History of Great Britain, and a General History and Description of the County of York.

Online Resources

http://mapapps.bgs.ac.uk/geologyofbritain/home.html
www.heritagegateway.org.uk/Gateway/Results_Application.aspx?resourceID=304
historicengland.org.uk/listing/the-list/

http://www.romanroads.org/yorkshiregazetteer.html

https://opendomesday.org/

https://www.york.gov.uk/.../id/.../conservation_areas_-_15_-_askham_richardpdf.pdf

APPENDIX 1

OSTEOLOGICAL ANALYSIS BY MALIN HOLST & KATIE KEEFE

January 2018

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Summary

In November 2017 York Osteoarchaeology Ltd was commissioned by LS Archaeology to carry out the osteological analysis of three partial skeletons and 1,097 disarticulated bone fragments. The remains were unexpectedly discovered in October 2017 during the excavation of footings for an extension to the rear of a joinery workshop, Old Joiners Workshop, Askham Richard, North Yorkshire (SE 53735 47980). The skeletal assemblage is currently undated and it is highly recommended that at least one of the inhumations undergo AMS dating.

Osteological analysis found that the assemblage consisted of largely disarticulated remains, as well as three inhumations, two of which only consisted of the lower limbs. A minimum of 23 individuals could be identified, including eighteen adults, three juveniles, one adolescent and one infant. Analysis of the articulated skeletons revealed that two of the individuals were mature adult males and one was a mature adult female. The age and sex of the disarticulated remains was more difficult to assess, however, ten right hip bones made it possible to estimate adult ages. Four of the hip bones were male, three of which were mature adults and one was an old middle adult. A further two had female characteristics, one of which was a young middle adult, and the other a mature adult. Sex could not be estimated in four hip bones, however, two appeared to be mature adults, one an old middle to mature adult and the final individual was a young to old middle adult.

Stature calculations revealed that Skeleton 17 (mature adult male) was approximately185.7cm in height, which is considerably taller than the stature calculated by Roberts and Cox (2003) for any period. Skeleton 19 (mature adult male) was 165.2cm and Skeleton 20 (mature adult female) was 165.0cm tall.

Degenerative changes, consistent with age, were observed in the hips and knees of two of the articulated burials and a number of the disarticulated remains. Relatively high levels of trauma were observed, including two healed rib fractures in Skeleton 17 (mature adult male). Healed trauma in the disarticulated bone assemblage included a fractured fibula, humerus and clavicle. Peri-mortem (at death) sharp force trauma was observed on an incomplete disarticulated cranium. The presence of Schmorl's nodes (axial stress lesions) and other traumatic lesions suggests a physically arduous life for some of the population. Signs of both active and remodelled inflammations were evident in the adult and non-adult population. Three benign tumours were recorded on three disarticulated cranial fragments.

Dental health appears to have been mixed, with over half of the teeth observed affected by dental plaque concretions, albeit generally slight deposits, which may suggest that some level of oral hygiene was attempted. Evidence of tooth decay and dental abscesses was limited. Prevalence of dental enamel hypoplasia caused by childhood stress was considerably higher in non-adults than in adults and suggests that individuals that experienced childhood stress were less likely to survive into adulthood.

Acknowledgements

York Osteoarchaeology Ltd would like to thank Donna Signorelli and Gigi Signorelli of LS Archaeology for their help and support during this project.

1.0 INTRODUCTION

In November 2017 York Osteoarchaeology Ltd was commissioned by LS Archaeology to carry out the osteological analysis of three skeletons and 1,097 disarticulated bone fragments. The skeletal assemblage had been excavated in October 2017 by LS Archaeology during a watching brief for the foundations digging at the rear of a joinery workshop, at Old Joiners Workshop, Askham Richard, North Yorkshire (SE 53735 47980).

During the watching brief 26 skeleton numbers were assigned. Three of these related to articulated remains, while the remaining numbers were assigned to disarticulated human bone contexts. The articulated remains were focused in the southwest corner of the excavated area. Each grave appears to have contained a simple inhumation with an extended supine skeleton. There was no evidence of skeletons having been placed in shrouds or coffins. The disarticulated material was focused along the entire southern half of the excavated area. A lack of human remains in the northern half of the area excavated area may suggest the northern limit of the cemetery was identified. However, it is, perhaps, more likely to be the result of landscaping and levelling associated with the erection of the joiner's workshop or quarrying of sand.

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.

1.2 METHODOLOGY

The skeletons were analysed in detail, assessing the preservation and completeness, 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 demographic profile of the assemblage based on the assessment of sex, age and non-metric traits. This information is essential in order to determine the prevalence of disease types and age-related changes. It is also crucial for identifying sex 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 is important, as it can have a large impact on the quantity and quality of information that it is possible to obtain from the skeletal remains.

Surface preservation, concerning the condition of the bone cortex, was assessed using the seven-category grading system defined by McKinley (2004), ranging from 0 (excellent) to 5+ (extremely poor). Excellent preservation implied no bone surface erosion and a clear surface morphology, whereas extremely poor preservation indicated heavy and penetrating erosion of the bone surface resulting in complete loss of surface morphology and modification of the bone profile. The degree of fragmentation was recorded, using categories ranging from 'minimal' (little or no fragmentation of bones) to 'extreme' (extensive fragmentation with bones in multiple small fragments). Finally, the completeness of the skeletons was assessed and expressed as a percentage: the higher the percentage, the more complete the skeleton.

The bone preservation of the inhumed skeletons was varied. Skeleton 17 (mature adult male) was moderate (Grade 3), Skeleton 19 (mature adult male) was in a good condition (Grade 2) and Skeleton 20 (mature adult female) was in poor condition (Grade 4; Table 1). The preservation of the disarticulated bone was also varied, ranging from 0 (excellent) to 5+ (extremely poor, Appendix B). Fragmentation of the intact skeletal remains (Skeleton 3) was considered to be minimal, as was the level of fragmentation of the disarticulated bone.

Table 1 Summary of osteological and palaeopathological results

Skeleton No	**Preservation***			**Age**	**Sex**	**Stature (cm)**	**Dental Pathology**	**Pathology**
	SP	**F**	**C**					
17	3 (Moderate)	Moderate	90%	46+	M	185.7 $^{+/-}$ 3.37	Calculus, caries, DEH, abscess.	Schmorl's nodes. DJC in the thoracic, sacral and lumbar spine, left hip and knee. Healed fractures to the 5th and 6th right ribs. OD on both tali
19	2 (Good)	Minimal	50%	46+	M	165.2 $^{+/-}$ 2.99	-	DJC in both hips and knees, vertebral border shift at the sacro-coccygeal border. Porosity on calcanei
20	4 (Poor)	Minimal	40%	46+	F	165.0 $^{+/-}$ 3.72	-	-

* Preservation: SP = surface preservation, graded according to McKinley (2004); F = fragmentation; C = completeness; DJC – degenerative joint changes; OD – *osteochondritis dissecans*;

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.

The minimum number of individuals that could be identified was 23, consisting of eighteen adults (represented by eighteen right femoral heads) three juveniles (represented by three left proximal femora shafts), one adolescent (based on the maximum length of the shaft of a left femur) and one infant represented by a complete unfused left femur shaft.

2.3 ASSESSMENT OF AGE

Age was determined using standard ageing techniques, as specified in Scheuer and Black (2000a; 2000b) and Cox (2000). For non-adults, age estimation is based on dental development and eruption, skeletal development (epiphyseal fusion) and long bone lengths (Scheuer and Black 2000b). In adults, age estimation largely relies on the presence of the pelvis and ribs and uses different stages of bone development and degeneration in order to calculate the age of an individual. It can be supplemented though examination of dental wear (Brothwell 1981). 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 than that they were eighteen or over).

Based on the degenerative changes visible on the auricular surfaces of the articulated skeletons, all three individuals appeared to be mature adults.

The majority of the disarticulated bones could not be aged more accurately than to say that they belonged to adults. However, ten right os coxae had preserved auricular surfaces, making it possible to estimate the age of the bones more accurately. Four of the os coxae were thought to belong to males, three of whom were mature adults and one was an old middle adult. A further two os coxae had female characteristics, one of which was a young middle adult and the other a mature adult. Finally, four os coxae were incomplete, and sex could not be reliably determined, however, two belonged to mature adults, one to an old middle to mature adult and the final individual belonged to either a young or old middle adult.

There was a small quantity of non-adult disarticulated bone, from which four distinctly different individuals could be identified. The first was an infant, based on bone size, the second was an adolescent based on the maximum length of the unfused femoral shaft, while the remaining three non-adult individuals were juveniles, but could not be aged more accurately due to the incomplete nature of the bones.

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 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.

Two of the articulated skeletons were male (Skeleton 17 and Skeleton 19), while Skeleton 20 was female. As mentioned above, ten right os coxae were recovered from the disarticulated assemblage, six of which were sufficiently complete to confidently assign sex. Four of the six individuals were male and the remaining two were female.

2.5 METRIC ANALYSIS

Stature depends on two main factors, heredity and environment; it 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, but preferably using the combined femur and tibia. The bone is measured on an osteometric board, and stature is then calculated using a regression formula developed upon individuals of known stature (Trotter 1970).

The stature of Skeleton 17 (mature adult male) was estimated at approximately 185.7cm, which is considerably taller than the stature calculated by Roberts and Cox (2003) for any period. Skeleton 19 (mature adult male) was approximately 165.2cm tall. Skeleton 20 (mature adult female) was approximately 165.0cm in height. It was not possible to assess stature for the disarticulated human bones, as sex estimation is required prior to stature assessment and sex cannot be identified from long bones.

Measurements of the femora (*meric* index) and tibiae (*cnemic* index) are used to calculate the shape of the shafts (Bass 1987). All femora from the articulated skeletons were *platymeric* (broad and flat). Thirteen femora from the disarticulated bone assemblage could be measured, seven of which were from the right side of the body and included two *eurymeric* (rounded), four *platymeric* (broad and flat) and one *hyperplatycnemic* (very flat) femur. The remaining six femora were from the left side of the body, two of which were *platymeric* (broad and flat) and four were *hyperplatycnemic* (very flat).

All tibiae from the articulated skeletons were *eurycnemic* (broad). Eight tibiae from the disarticulated assemblage could be measured, five were from the left and two of these were *mesocnemic* (average) and

three were broad (*eurycnemic*). Two right tibiae were *eurycnemic* (broad) and one was *mesocnemic* (average).

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.

Non-metric traits observed in Skeletons 17 and 19 (mature adult male) included *ossicles* at the *parietal notch* and asterion (small bones within the suture at the side of the skull), mastoid foramen, extrasutural and sutural mastoid foramen (small holes in side of the skull). Bennett (1965) has suggested that the formation of ossicles around the sutural margins may be related to stresses placed on the growing cranium during foetal life and early infancy, while the small holes observed in the cranium facilitate the transmission of blood vessels (Scheuer and Black 2000b, 97).

Non-metric traits in the post-cranial remains of Skeletons 17 and 19 included *femoral plaque* (roughened area on the femoral neck), Allen's *fossa* (area of porosity on the femoral neck), *hypotrochanteric fossa* (indentation on the back of the thigh bone), third trochanters (nodule of bone on the back of the femoral shaft), *exostosis in the trochanteric fossa* (spicules of bone on the femoral neck), *vastus fossae and vastus notches* (changes to the shape of the knee cap)*, lateral tibial squatting facet* (extension to the ankle articulation) *peroneal tubercle* (small nodule of bone on the ankle) and *lateral talar extension* (increased surface area on part of the ankle joint).

A full list of the non-metric traits identified in the disarticulated assemblage is available in Appendix B.

2.7 CONCLUSION

The osteological analysis of the skeletal remains from Askham Richards established that the assemblage consisted largely of disarticulated remains. A minimum of 23 individuals were identified, including eighteen adults, three juveniles, one adolescent and one infant. All three of the articulated skeletons had survived into mature adulthood, two of whom were males and one was female. A small number of non-metric traits observed amongst the skeletal remains. Stature could be calculated for all three articulated individuals; one of the males was approximately185.7cm, which is considerably taller than the stature calculated by Roberts and Cox (2003) for any period. The other male was approximately 165.2cm and the female was 165.0cm tall.

Limited data on the age and sex of the disarticulated assemblage could be retrieved, however, sex could be assessed in six os coxae, four of which belonged to males and two to females. The age of ten os coxae could be established, with four mature adults (3 male, 1 female, 2 unsexed), two old middle adults (1 male, 1 unsexed) and two young middle adults (1 female, 1 unsexed).

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. All bones were examined macroscopically for evidence of pathological changes.

3.1 CONGENITAL CONDITIONS

Heredity and environment can influence the embryological development of an individual, leading to the formation of a congenital defect or anomaly (Barnes 1994). The most severe defects are often lethal and if the baby is not miscarried or stillborn, it will usually die shortly after birth. Such severe defects are rarely seen in archaeological populations, but the less severe expressions often are and these individuals will usually have been unaware of their condition. The frequency with which these minor anomalies occur may provide information on the occurrence of the severe expressions of these defects in the population involved (Barnes 1994). It may also provide information on levels of maternal health (Sture 2001).

3.1.1 Transitional Vertebrae and Additional or Absent Vertebrae

The normal human spine consists of seven cervical (neck), twelve thoracic (chest) and five lumbar (lower back) vertebrae, making a total of 24 independent segments. The sacrum (at the base of the spine, forming the back of the pelvis) is usually composed of five fused vertebral segments and the coccyx (vestigial tail) is normally made up of four fused vertebral segments. The overall total of vertebral segments is therefore 33.

Additional vertebrae occur when there is an extra vertebral segment, increasing the total number of segments in the spine. They usually occur at the junction between the thoracic and lumbar vertebrae (where they take on the appearance of a thoracic vertebra), or at the junction between the lumbar vertebrae and the sacrum. In the latter instance, they either appear as an additional (sixth) lumbar vertebra, or become partially or fully incorporated into the sacrum (Barnes 1994, 78).

Transitional vertebrae can occur at the borders between different types of vertebra, when a vertebra from one group takes on some or all of the characteristics of an adjacent group, for example the first lumbar vertebra (in the lower back) may develop vestigial ribs (Barnes 1994, 79-116). The process by which this happens is known as 'border shifting'. The end result is to increase the number of segments in one part of the spine at the expense of the adjoining part (e.g. increasing the number of thoracic vertebrae to thirteen through incorporating the first lumbar vertebra, but decreasing the number of lumbar vertebrae to four). Transitional vertebrae are reasonably common, particularly at the lumbo-sacral border (between the fifth lumbar vertebra and the sacrum, at the base of the spine), but the consequences of the border shift become more severe the higher up the spine it occurs (Barnes 1994, 79-116).

A complete and well preserved spine is required to determine whether any variation in the expected number of vertebrae in each group is the result of a genuine extra vertebral segment (i.e. an additional vertebra) or due to a border shift and if the latter, what kind of shift has taken place.

The first coccygeal vertebra had fused to the base of the sacrum in Skeleton 19 (mature adult male), creating a caudal shift between the sacro-coccygeal border. A disarticulated sacrum recovered from Context 2, belonging to an unsexed adult, also showed fusion between the first coccygeal vertebra and the base of the sacrum.

3.1.2 Non-Osseous Tarsal Coalition

Distinctive defects in the articular surfaces between the third metatarsal and the lateral cuneiform (foot arch) have been attributed to failure of the bones to separate correctly during early development. In life the two bones would have been joined by a bridge of fibrous or cartilaginous material, and so the lesions can be described as non-osseous tarsal coalitions (Regan *et al.* 1999). The lesions manifest as hollows with porous floors on the plantar third of the joint surface.

A disarticulated third metatarsal and lateral cuneiform from Context 22 exhibited roughened irregular pitting on the inferior half of their corresponding articular surfaces. It is likely that the bones originated from the same individual, and that the lesions were the result of non-osseous tarsal coalition. Frequencies of up to 26% have been reported in the literature for various archaeological and modern populations (Regan *et al.* 1999).

3.2 METABOLIC DISEASE

Humans require an adequate supply of nutrients during childhood to support normal growth and development. Particular conditions are associated with the lack of specific nutrients, for example scurvy results from a diet lacking in vitamin C (found in fresh fruit and vegetables, and marine fish) and rickets from a lack of vitamin D (produced by the body during exposure to sunlight).

Diagnosis of nutritional deficiencies in ancient populations is complicated by the fact that the skeletal changes can be difficult to diagnose, and that nutritional deficiencies tend not to occur in isolation (a diet deficient in one nutrient is very often deficient in others). In addition, many of the skeletal changes that develop in a child as a response to nutritional deficiency will be largely remodelled by the time the individual reaches adulthood (Ortner 2003, Lewis 2007).

3.2.1 *Cribra Orbitalia* and Anaemia

Cribra orbitalia is a term used to describe fine pitting in the orbital roof, which develops during childhood and often recedes during adolescence or early adulthood. Until recently, iron deficiency anaemia was the accepted cause of these lesions (Stuart-Macadam 1992), but a strong case has been made by Walker *et al* (2009) for different types of anaemia as the causative factor. These include megaloblastic anaemia in the New World, suggesting a diet deficient in Vitamin B_{12} (i.e. plant-based and lacking in animal products) and/or folic acid. Such dietary deficiency could have been exacerbated through poor sanitation leading to infection and infestation with gut parasites (*ibid*).

In malarious areas of the Old World, haemolytic anaemia (e.g. sickle cell anaemia and thalassemia) may be important in the development of *cribra orbitalia* (*ibid*). However, for areas such as northern Europe they have proposed that *cribra orbitalia* may be more likely related to conditions such as scurvy (Vitamin C deficiency) or chronic infections (*ibid*). The argument was countered by Oxenham and Cavill (2010) who stated that iron deficiency anaemia should still be considered in a differential diagnosis.

A study in 2016, albeit based on a small sample, conducted by Zarifa *et al*. found a correlation between individuals with *cribra orbitalia* and decreased levels of copper and lead in their bone. The same individuals also exhibited significantly lower levels of δ^{15} N isotope levels, suggesting their diet consisted, to a greater degree, of lower trophic level food sources.

Cribra orbitalia is often used as an indicator of general stress (Lewis 2000, Roberts and Manchester 2005) and is often found associated with agricultural economies (Roberts and Cox 2003).

Cribra orbitalia was evident in the disarticulated right orbits of a skull from Context 4 (adult female), Context 7 (adult male) and Context 26 (older juvenile). Similar lesions were observed in the orbits of an adult from Context 21 (?male) and Context 25 (1 male, 1 female).

3.2.2 *Hyperostosis Frontalis Interna*

Hyperostosis Frontalis Interna (HFI) appears as irregular nodules of bone on the internal surface of the frontal bone (forehead), believed to be the result of changes in the hormones secreted by the pituitary gland. HFI is almost always seen in females over the age of thirty and has been associated with pregnancy and *acromegaly* (a disorder involving overproduction of growth hormone during adulthood) (Aufderheide and Rodríguez-Martín 1998; Roberts and Manchester 2005).

Small, rounded nodules of bone were seen on the endocranial surface of a disarticulated frontal bone of an adult possible female from Context 5, which were believed to be the result of HFI.

3.3 INFECTIOUS DISEASE

Bone can respond to infection through depositing new bone at the site of an inflammation. Initially this bone is disorganised and porous, and is termed 'woven bone'; the presence of this type of bone indicates an infection that was active at the time of death. With time, the woven bone deposits are remodelled, becoming smooth and organised 'lamellar bone'. The presence of lamellar bone suggests the infection had healed. Bone requires time to respond to infection, so new bone formation only occurs with chronic conditions (i.e. where the person survived for a time before recovery or death). Acute conditions, where the person either died or recovered within a short space of time, will not leave evidence in the skeleton (Roberts and Manchester 2005; Ortner 2003).

3.3.1 Non-Specific Infection

Identification of a specific infection is difficult in archaeological skeletal remains since the bone-changes caused by different infections are usually similar in appearance. The exceptions are tuberculosis, leprosy and treponemal disease (including syphilis), where the changes are distinctive enough to allow these diseases to be recognised (Roberts and Manchester 2005; Ortner 2003). Other infectious diseases are described as 'non-specific' infections, as the bone-changes observed are too general to allow diagnosis.

A disarticulated fragment of frontal bone thought to belong to an adult male from Context 4 exhibited fibrous lamellar bone across the endocranial surface of the cranial vault fragment. Endocranial lamellar bone was present on the squamous part of a frontal bone and the sagittal sulcus between the two parietals of another cranial vault from Context 4 and a fragment of occipital, which belonged to another adult from the same context. A juvenile occipital bone fragment, also from Context 4, exhibited woven bone on the endocranial surface, suggesting that the inflammation was still active when the individual died. An adult male occipital bone from Context 10 had lamellar bone within the cruciform eminence.

A disarticulated adult tibia shaft from Context 4 had striated lamellar bone along the entire length of the medial surface of the shaft. The inflammation was not active at the time of the individual's death. Lamellar bone was also identified along the medial surface of the mid shaft of a tibia belonging to an adolescent/young adult from Context 9. A distal tibia fragment from Context 24 was covered in woven bone, across the posterior surface and medial malleolus, suggesting that the inflammation was still active at the time of the individual's death. Inflammation of the lower legs is a particularly common finding in archaeological populations (Roberts and Manchester 2005).

3.3.2 Osteitis and Osteomyelitis

Infection of the cortex of the bone is known as 'osteitis', while involvement of the medullary cavity in the centre of the bone is known as 'osteomyelitis' (Roberts and Manchester 2005, 168). In the latter, enlargement of the bone shaft is observed as a result of new bone formation, which may eventually surround the original surface completely. Destruction of the internal structures of the bone occurs with pus formation, and a fistula may form, allowing the pus to drain into the surrounding tissues. Death of the original bone shaft may occur (Roberts and Manchester 2005, 168-169).

4.1 

5.1 **Plate 1** Left femur from Context 22, possible fistula

The distal half of an adult left femur from Context 22 had thick deposits of lamellar bone along its entire shaft. Woven bone was also present, overlying the lamellar bone on the posterior surface of distal shaft, suggesting that the infection was chronic. The original structure of the cortex had been replaced by low quality porotic bone. A possible fistula was identified on the lateral surface of lateral condyle (Plate 1). The lesion had a smooth medial edge and sharp lateral edge, but was occluded with mud, making it impossible to determine if it connected with the medullary cavity. A radiograph would be useful to determine whether the infection should be classified as osteitis or osteomyelitis.

3.4 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 (Rogers 2000, Roberts and Manchester 2005).

3.4.1 Degenerative Joint Changes

Skeleton 19 (mature adult male) had mild degenerative changes in both hips and knees, while Skeleton 17 (mature adult male) exhibited similar changes in his right hip and knee. The mature adult male also had degenerative changes in his spine, affecting the thoracic, lumbar and sacral vertebrae.

Degenerative joint changes were noted in the disarticulated proximal right humerus (part of the shoulder) from Context 2, twelve lumbar vertebral facets from Context 5, the distal articulation of a metacarpal (palm of the hand) from Context 5, three thoracic vertebral bodies from Context 7 and a twelfth thoracic vertebra from Context 9, the inferior facets of a mid thoracic vertebra from Context 16.

A disarticulated lumbar vertebral body from Context 19 exhibited severe osteophytic lipping. Two right acetabula, one belonging to a mature adult male and the other a mature adult female from Context 19 exhibited mild degenerative changes, as did the superior and inferior articulations of a femur from the same context. A lumbar vertebra from Context 20 exhibited moderate osteophytic lipping on the superior surface of the body. Mild osteophytic lipping was observed the margin of the superior surface of a central thoracic vertebra from Context 25. Finally, an acetabulum from a mature adult male, also from Context 25, showed moderate degenerative changes.

According to Roberts and Manchester (2005), the hips and knees, being the weight bearing joints of the lower limb, frequently degenerate in modern populations, with Aufderheide and Rodríguez-Martín (1998) suggesting

over 50% of those over 60 years of age may suffer from degeneration of the hips.

3.4.2 Osteoarthritis

Osteoarthritis (OA) is a degenerative joint disease of synovial joints 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 diagnostic expression of OA. Other features associated with degeneration of the joint include osteophytes (bone formation) on the surface or around the margins, porosity on the surface and the development of cysts (Rogers 2000; Roberts and Manchester 2005). However, a joint was only diagnosed as showing evidence for OA if eburnation was present.

OA is frequently associated with increasing age, but can be the result of mechanical stress and other factors, including lifestyle, food acquisition and preparation, social status, sex and general health and body weight (Larsen 1997; Roberts and Manchester 2005).

Skeleton 17 (mature adult male) had osteoarthritis in his lower spine, affecting the articulating facets of his twelfth thoracic vertebra and four of his lumbar vertebra.

An inferior articulating facet from a disarticulated lumbar vertebra from Context 5 had eburnation, which was thought to be the result of osteoarthritis.

3.4.3 Schmorl's nodes

Schmorl's nodes are indentations in the upper and lower surfaces of the vertebral bodies caused by the pressure of herniated vertebral discs (Aufderheide and Rodríguez-Martín 1998). Discs may rupture due to trauma, but vertebrae weakened by infection, osteoporosis or neoplastic disease may be more vulnerable (Roberts and Manchester 2005). Schmorl's nodes are often associated with degenerative changes to the vertebral bodies (Aufderheide and Rodríguez-Martín 1998, Hilton *et al.* 1976) and are most commonly seen in the lower thoracic vertebrae (*ibid*).

Skeleton 17 (mature adult male) had Schmorl's nodes on the body of his twelfth thoracic vertebra and two of his lumbar vertebrae.

A series of three disarticulated lumbar vertebrae from Context 5 exhibited depressions on the superior and inferior surfaces of the vertebral bodies, which were interpreted as a Schmorl's nodes. A further four lower thoracic vertebrae also had Schmorl's nodes on the superior and inferior surfaces of the bodies, and a further two had indentations on the inferior surfaces of the bodies only. Three lower thoracic vertebrae from Context 7 also exhibited Schmorl's nodes on the inferior surfaces of the bodies. Schmorl's nodes were observed on the superior and inferior surfaces of the body of a twelfth thoracic vertebra from Context 9, a mid thoracic and a lumbar vertebra from Context 13 and on the inferior surface of a thoracic vertebral body from the same context. Another Schmorl's node was recorded on the inferior body of a lower thoracic vertebral body from Context 22, the inferior body of a mid thoracic vertebra from Context 23 and a lumbar vertebra from Context 25. The location of the lesions in the lower regions of the spine is typical for Schmorl's nodes (Hilton *et al.* 1976).

3.5 TRAUMA

The evidence for trauma in archaeological populations is restricted to that visible in the skeletal remains, unless soft tissue is preserved (Roberts and Manchester 2005, 85-86). Therefore, most of the soft-tissue injuries sustained by archaeological populations will be invisible, although occasionally soft tissue injuries can be inferred though ossification of the tissues at the site of damage, known as *myositis ossificans* (*ibid*). Much of the evidence for trauma in archaeological populations focuses on fractures to the bones (*ibid*, 84-85),

although long standing well-healed fractures may be hard to detect (Jurmain 1999, 186).

Ante-mortem injuries occurred during life and show evidence for healing, whereas peri-mortem injuries occurred around the time of death and consequently no evidence for healing will be seen. Peri-mortem injuries did not necessarily occur at the instant of death. It takes time for evidence of healing to be visible in the bone following an injury, and also for bone to lose the physical characteristics it had in life following death. Therefore 'peri-mortem' really refers to a three-week window either side of death (Roberts and Manchester 2005, 114). It is impossible to determine from the macroscopic appearance of the bone whether an injury occurred a week before the person died, or minutes before they died; or whether the injury was caused the day or a week after they had died. Distinguishing between peri-mortem trauma and post-mortem damage can be difficult. Generally, post-mortem breaks will have a paler surface than the surrounding bone and broken edges will usually be perpendicular to the bone (*ibid*, 114-116; Lovell 1997, 145; Sauer 1998). Recent post-mortem breaks are usually easily distinguished, but breaks that occurred while the skeleton was in the burial environment and long before the skeleton was excavated may be much harder to identify as such.

3.5.1 Avulsion fractures

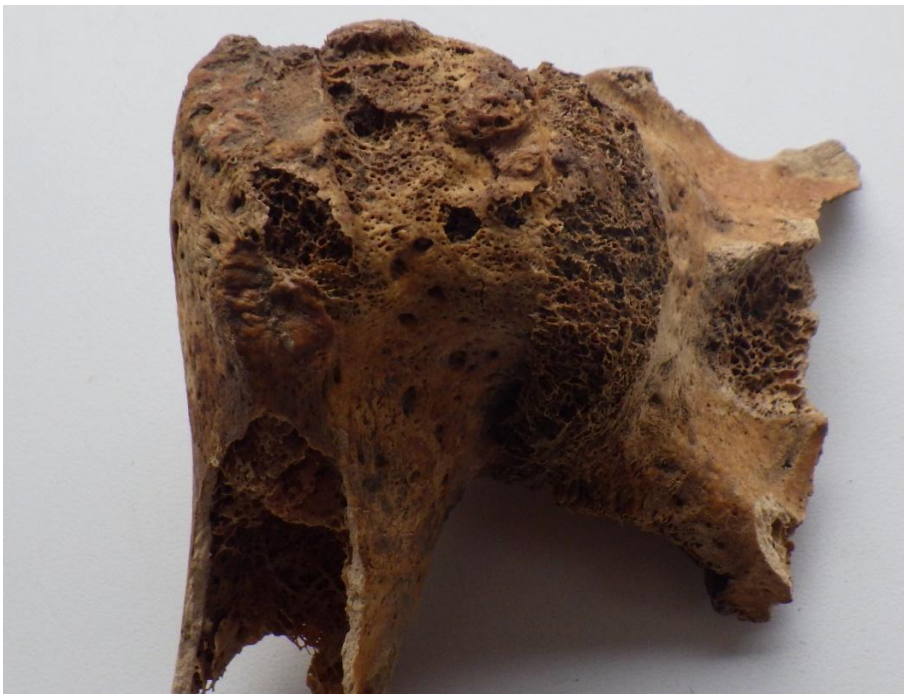
An avulsion fracture occurs when a fragment of bone is torn away from the main bone through trauma to a ligament or tendon. The spinous process of a disarticulated sixth or seventh cervical vertebra from Context 5 appeared shortened, which may have been the result of a fracture. The spinous process of the seventh cervical vertebra is the nodule of bone that can be palpated at the base of the back of the neck. This type of fracture has been termed 'clay shoveller's fracture', as it was common among untrained unemployed men put to work digging drainage ditches through clay soils in Western Australia (McKellar 1940). It was suggested that their lack of experience in that type of manual work and poor physical condition led to the fractures.

A fragment of disarticulated os coxa belonging to an unsexed adult from Context 24 had a large indentation on the superior/posterior margin of the acetabular rim (hip bone), as if a chunk was missing. The lesion may have been caused by excessive exertion of the *rectus femoris* muscle (Naudé *et al*. 2003). This occurs when the hip is hyper-extended and the knee is flexed. The injury occurs mostly in sports that involve kicking (*ibid).*

3.5.2 Ante-Mortem Fractures

Skelton 17 (mature adult male) had two well healed rib fractures, which were located on the angle of his right, fifth and sixth ribs. Both fractures were slightly oblique, with anterior and medial displacement of the lateral fragment. Tomczak and Buikstra (1999, 255) found that compression injuries to the chest cause rib fractures at the curved parts of the ribs, at the side of the body (*ibid*).

A disarticulated possible second adult metacarpal from Context 5 showed evidence for a fracture to the proximal end of the shaft, with potential fusion of the trapezoid carpal bone secondary to the trauma. Unfortunately, the proximal end of the bone was incomplete, making it difficult to determine the nature of the trauma. Galloway (1999, 236) suggests that fractures to metacarpal bases may result from a combination of forces, including forces along the axis, direct blows or torque may also be involved. A radiograph of the bone may reveal further information. A fragment of disarticulated proximal fibula from Context 11 had a well healed, oblique, fracture, which exhibited anterior and inferior displacement of the proximal part. According to Galloway (1999, 203), these fractures tend to occur when the bone is rotated externally.

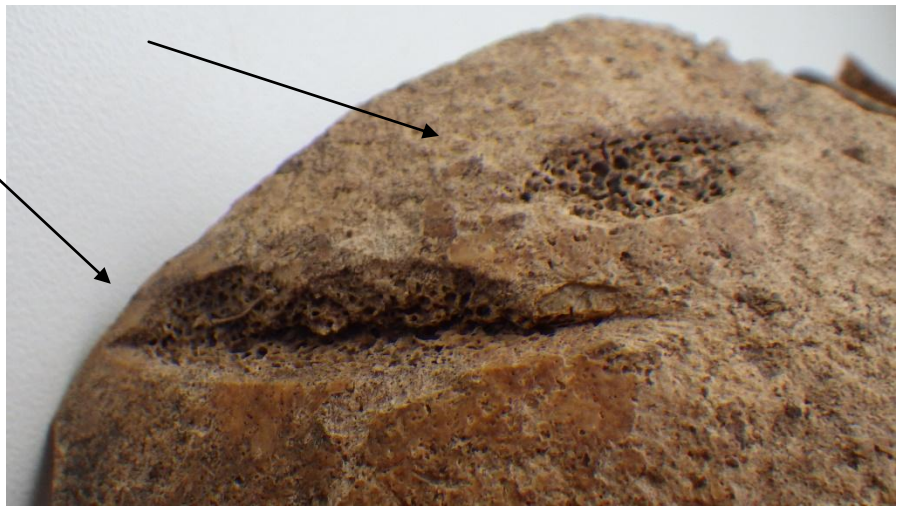
6.1 

7.1 **Plate 2** Proximal, left, humerus and scapula from Context 24

A fragment of disarticulated proximal left humerus and scapula from Context 24 had fused together around the margins of the capsular ligament (Plate 2), with evidence of rotator cuff trauma (spiculated bone). It is possible that the head of the humerus had been fractured and displaced slightly posteriorly with associated fusion of the capsular ligament as an attempt to stabilise the joint. The well healed nature of the possible fracture suggests that the traumatic incident which caused it occurred a significant amount of time, prior to the individual's death. According to Galloway (1999, 120) proximal humeral fractures occur mostly in juveniles, adolescents and older adults, in particular; women due to the loss of bone density post menopause. In younger individuals the trauma is often the result of falls from a height, while less force is required to break the bone in mature individuals (*ibid*, 121). Furthermore, fractures in older individuals, usually result in less displacement and soft tissue damage, than fractures occurring in younger individuals, which are usually the result of high impact falls (*ibid*).

An incomplete disarticulated adult clavicle shaft from Context 25, had a well healed oblique fracture, located on the lateral half of the shaft, with slight superior and anterior displacement of the fragment. Approximately half of all clavicle fractures occur during childhood (Galloway 1999, 114). In adults the injuries are often the result of a fall onto the shoulder, but may also be caused by direct force (*ibid*).

3.5.3 Peri-Mortem Trauma

8.1 

9.1 **Plate 3** Sharp force trauma to endocranial vault, Context 1

A disarticulated adult skull from Context 13 had two peri-mortem sharp force trauma lesions on the posterior-medial-superior portion of the left parietal (Plate 3). The first measured 38.4mm in length by 9.3mm wide. The lesion was orientated anterior-laterally to posterior-medially. The posterior edge was sharp, well defined and smooth, with a roughened, irregular, anterior edge, suggesting that the impact came from behind. The second lesion was located 5mm medially of the first, and measured 25.6mm in length by 7.1mm wide. The cut was orientated more coronally than the first, but still had an anterior-lateral, posterior-medial orientation. The anterior edge was sharp, well defined and smooth, with a roughened, irregular posterior edge, suggesting that the impact came from in front. Both lesions appear to have penetrated the diploe but did not involve the inner table.

3.5.4 *Myositis Ossificans Traumatica*

Myositis ossificans traumatica is caused by the avulsion of tendons or muscle attachments (Aufderheide and Rodríguez-Martín 1998, 26); severe trauma to muscular tissue can sometimes result in the ossification of the muscle tissue itself (Ortner 2003, 133). The most commonly observed sites are on the femur at the insertion of the extensors and abductors, the humerus at the insertion of *deltoid* and *pectoralis* (major and minor) (*ibid*). These traumatic lesions are most commonly seen in young adults (*ibid*, 134).

An irregular nodule bone, on the inferior surface of a disarticulated second or third metacarpal shaft from Context 7 may have been the result of m*yositis ossificans traumatica.* The location of the lesion suggests that either the second or third *palmar interosseous* was traumatised. The muscle is involved in adduction, flexion and extension of the finger (Stone and Stone 1995, 148).

3.5.5 *Osteochondritis Dissecans*

Localised death (necrosis) of a small part of the joint surface can be caused by trauma. When this happens, the damaged piece can become detached from the rest of the joint surface, known as *osteochondritis dissecans* (Roberts and Manchester 2005, 121). These lesions appear as roughly circular, porous depressions in the joint surfaces of skeletal remains.

Skeleton 17 (mature adult male) had bilateral circular lesions, on the inferior talar articulations. The lesions measured approximately 11mm in diameter, and were thought to have been caused by o*steochondritis dissecans*.

A disarticulated humerus from Context 22 had a roughly circular lytic lesion approximately 7mm in diameter,

located on capitulum (part of the elbow joint).

3.6 NEOPLASTIC CONDITIONS

The term 'neoplastic' literally translates as 'new growth' and it refers to the uncontrolled growth of any tissue, including bone (Roberts and Manchester 2005, 252). Benign lesions are contained within a local area and have discrete boundaries; they are usually slow-growing. In contrast, malignant neoplasms grow and spread at an uncontrolled rate and frequently distribute themselves throughout the body (Roberts and Manchester 2005). Neoplastic conditions are infrequently reported among archaeological populations, but routine radiography (rarely carried out unless part of a research project) would be required to identify internal bone changes before they become visible macroscopically and it seems likely that the true prevalence is being under-diagnosed (*ibid*).

3.6.1 Ivory/ Button Osteomas

Ivory osteomas are small dense round nodules of lamellar bone that appear as smooth well-demarcated lumps on the external surface of the cranium (Roberts and Manchester 2005, 255). These are benign lesions and cause no symptoms (*ibid*). An ivory osteoma was observed on a disarticulated skull fragment, on the endocranial surface, immediately above the right orbital ridge of a frontal bone, belonging to an adult from Context 4. The osteoma had well defined margins and measured 5mm in diameter. Another osteoma was identified in the exact same location on a disarticulated frontal bone belonging to an adult possible male from Context 9; the lesion was 4mm in diameter. A further button osteoma was present on the left side of the posterior part of a frontal bone fragment, which belonged to an adult from Context 12. The osteoma was well integrated into the surface of the bone and measured 7mm in diameter.

3.7 MISCELLANEOUS

3.7.1 Fusion of Sacrum and Pelvis

Two disarticulated incomplete right os coxae from Context 24 exhibited signs of sacro-iliac fusion. It was possible to age and sex one of the os coxae, which appeared to belong to an old middle adult, male. In this individual a large syndesmophyte was present on the superior-lateral margin of the auricular surface, and was orientated towards the sacrum. The second example involved the fusion of the inferior half of sacral ala to the inferior half of the auricular surface. Barnes (2012) refers to a condition known as 'sacroiliac coalition', where cartilaginous plates between the two bones ossify as the elements develop. However, she states that '…there is no indication of a joint having ever been present, as the union is smooth and uninterrupted' (*ibid*, 167). Other reasons for the fusion of the joint could be related to degenerative joint disease (*ibid*). It is likely that degenerative changes were responsible for the sacro-iliac fusion observed in the disarticulated skeletal remains, considering that the joint surfaces were still evident in both cases.

3.6 CONCLUSION

Considering the small assemblage of bone recovered from Askham Richards, a number of pathological lesions were observed.

Stresses in the form of anaemia during childhood affected a number of individuals, as evidenced by the presence of *cribra orbitalia* in a number of disarticulated orbits. Joint disease was relatively uncommon in this population. Evidence of physical strain to the spine in the form of Schmorl's nodes were observed in several adult vertebrae. Traumatic injuries were prevalent. The most frequent types of injury involved fractured long bones (fibula, clavicle and humerus), all of which were healed at the time of death. Rib fractures were observed in Skeleton 17. Other traumatic conditions included *avulsion fractures* and *osteochondritis dissecans*. One skull fragment in the disarticulated assemblage exhibited evidence of peri-mortem (unhealed) sharp force trauma.

Superficial bone inflammations were relatively common, particularly affecting the lower limbs, which are commonly affected in archaeological populations and on the inner skull surfaces. The lesions affected both adults and non-adults. Osteomyelitis, a condition associated with a severe bone infection, may have been present in a disarticulated femur belonging to an adult. Small benign tumours were observed in three disarticulated skulls, but would not have had any impact on the individuals affected.

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.

Of the articulated skeletons, only Skeleton 17 (mature adult male) had any surviving teeth or tooth sockets. In total, Skeleton 17 had sixteen tooth positions and fourteen teeth, three of the tooth positions belonged to teeth that had been lost post-mortem.

The number of tooth positions from the disarticulated assemblage totaled 202, with 137 teeth recovered. Of these, 178 tooth positions and 123 teeth belonged to adults and the remaining 24 tooth positions and fourteen teeth belonged to non-adults.

4.1 DENTAL CALCULUS

Calculus (mineralised dental plaque) is commonly observed in archaeological populations whose dental hygiene was not as rigorous as it is today. If plaque is not removed from the teeth effectively (or on a regular basis) then these plaque deposits mineralise and form concretions of calculus on the tooth crowns or roots, along the line of the gums (Hillson 1996).

Skeleton 17 (mature adult male) had flecks to slight deposits of calculus on six out of sixteen teeth.

Over half of the adult teeth from the disarticulated assemblage were affected by calculus (95/178; 53.4%), although the deposits tended to be slight. Calculus was far less prevalent amongst the non-adults (1/14; 7.1%).

4.2 DENTAL CARIES

Dental caries (tooth decay) forms when bacteria in the plaque metabolise sugars in the diet and produce acid, which eventually leads to the formation of a cavity in the tooth (Zero 1999). Simple sugars can be found naturally in fruits, vegetables, dried fruits and honey, as well as processed, refined sugar; since the latter three contain the most sucrose they are most cariogenic. Complex sugars are usually less cariogenic and are found in carbohydrates, such as cereals. However, processing carbohydrates, including grinding grains into fine powders or cooking them, will usually increase their cariogenicity (Moynihan 2003).

Skeleton 17 (mature adult male) had three caries on three of their sixteen teeth, suggesting that this individual had a diet high in cariogenic food. Only the adult teeth from the disarticulated assemblage were affected by caries, with 4/123 (3.3%) teeth exhibiting small carious lesions.

4.3 DENTAL ENAMEL HYPOPLASIA

Dental enamel hypoplasia (DEH) is the presence of lines, grooves or pits on the surface of the tooth crown, and occurs as a result of defective formation of tooth enamel during growth (Hillson 1996). Essentially, they represent a period when the crown formation is halted, and they are caused by periods of severe stress, such as episodes of malnutrition or disease, during the first seven years of childhood. Involvement of the deciduous (milk) teeth can indicate pre-natal stress (Lewis 2007). Trauma can also cause DEH formation, usually in single teeth.

DEH was noted in seven of sixteen teeth (43.8%) belonging to Skeleton 17 (mature adult male). A further six adult teeth from the disarticulated assemblage were also affected by DEH (6/123; 4.9%). A quarter of non-adult teeth from the disarticulated assemblage also had DEH (4/14; 28.6%).

4.4 ANTE-MORTEM TOOTH LOSS

Ante-mortem tooth loss (AMTL), or the loss of teeth during life, can occur as a result of a variety of factors, including dental caries, pulp-exposure from heavy tooth wear, or periodontal disease (occurring when inflammation of the gums, gingivitis, spreads to the underlying bone). Gingivitis can result when deposits of calculus on the teeth aggravate the gums. Once the tooth has been lost, the empty socket is filled in with bone.

Four teeth from the disarticulated bone assemblage had been lost ante-mortem (2.2%; 4/178), all of which belonged to adults.

4.5 ABSCESSES AND PERIAPICAL LESIONS

Dental abscesses occur when bacteria enter the pulp cavity of a tooth causing inflammation and a build-up of pus at the apex of the root. Eventually, a hole forms in the surrounding bone allowing the pus to drain out and relieve the pressure. They can form as a result of dental caries, heavy wear of the teeth, damage to the teeth (e.g. fractures), or periodontal disease (Roberts and Manchester 2005). However, Ogden (2008a; 2008b) has cautioned that granulomata and cysts can also lead to the development of similar lesions at the apices of the teeth, although these are usually only exposed through post-mortem damage to the bone.

Skeleton 17 (mature adult male) had an externally draining abscess on the left side of his mandible, at the root of the first molar. Amongst the disarticulated bone belonging to adults, two abscesses were recorded, one of which was internally and the other externally draining. In total just over 1% of the disarticulated adult tooth positions (2/178) were affected by abscesses. The maxilla of an older juvenile from Context 26 had a very large internally draining, abscess, located at the roots of the right incisors and canine, overall 12.5% (3/24) non-adult tooth positions were affected by abscesses.

4.6 DENTAL ANOMALIES

Occasionally teeth fail to develop, leading to congenitally absent teeth. Usually only one or two teeth fail to develop, most often the third molars, followed by the upper second incisors, and upper and lower second premolars (Hillson 1996, 113-114).

Six teeth (3.4%, 6/178), all of which were third molars from the disarticulated adult bone assemblage had either failed to erupt or were congenitally absent. Hillson (1996, 114) has noted that congenital absence of teeth may be inherited and that absence of teeth may be associated with other dental anomalies.

4.7 DENTAL CONCLUSIONS

Only Skeleton 17 (mature adult male) had a preserved detention. Analysis revealed that the individual had relatively poor dental health, with calculus, caries and a dental abscess. The mature adult male appears to have experienced episodes of stress during childhood, as evidenced by grooves in the teeth.

Dental health appears to have been mixed in the disarticulated assemblage, with over half of the teeth observed affected by calculus, albeit slight deposits. Evidence of tooth decay was limited, but a small number of dentitions suggest some individuals had a diet high in sugars and refined carbohydrates. A small number of dental abscesses were also present in the adults and non-adults. In particular the maxilla of an older juvenile from Context 26 had a very large, internally draining, abscess, involving the roots of three teeth. A small number of dental anomalies were also present amongst the population, and may have been genetic in origin.

Levels of dental enamel hypoplasia were considerably higher in non-adults than in adults, suggesting that individuals that had experienced severe childhood stress were less likely to survive into adulthood.

5.0 DISCUSSION AND SUMMARY

The osteological analysis of the skeletal assemblage from The Joinery Workshop, Askham Richard, has provided an insight into the lives of the individuals excavated. During the watching brief three articulated skeletons and a large quantity of disarticulated bone (1,097 fragments) were recovered. The articulated remains were found in the southwest corner of the excavated area. Each grave appears to have contained a simple inhumation in an extended supine position. No evidence of shrouds or coffins was seen. The disarticulated material was focused along the entire southern half of the excavated area. It is possible that quarrying had caused disturbance of the burials. A lack of human remains in the northern half of the excavated area may suggest the northern limit of the cemetery was identified, but is, perhaps, more likely to be the result of landscaping and levelling associated with the erection of the joiner's workshop.

In total, a minimum of 23 individuals were identified in the assemblage, which consisted of eighteen adults, three juveniles, one adolescent and one infant. The articulated skeletons consisted of two mature adult males and one mature adult female. Among the disarticulated assemblage ten right hip bones were recovered; four of these were thought to belong to males, three of which were mature adults and one was an old middle adult. A further two hip bones were probably female, one of which was a young middle adult, and the other a mature adult. Finally, sex could not be reliably determined for the remaining four hip bones, however, two appeared to be mature adults, one an old middle to mature adult and the final individual was either a young or old middle adult.

Stature could be calculated for all three articulated individuals, Skeleton 17 (mature adult male) was approximately185.7cm in height, which is taller than the male stature calculated by Roberts and Cox (2003) for any period. Skeleton 19 (mature adult male) was approximately 165.2cm and Skeleton 20 (mature adult female) was approximately 165.0cm. A small number of non-metric traits were observed amongst the skeletal remains.

Evidence for childhood stress was noted in some individuals/disarticulated bones, in the form of *cribra orbitalia* in several disarticulated orbits and lines in the teeth (dental enamel hypoplasia) observed in Skeleton 17 and teeth from the disarticulated dentitions. Levels of dental enamel hypoplasia were considerably higher in non-adults than in adults and suggest that individuals who experienced childhood stress were less likely to survive into adulthood.

Evidence for both active and remodelled inflammations were evident and focused on the inner skull surface and lower limbs. The inflammations affected both adults and non-adults. The distal half of an adult left femur from Context 22 may have developed a more severe infection inside the bone.

Considering the advanced age of many of the adults, limited evidence of joint disease was observed, however, Skeleton 17 (mature adult male) had developed osteoarthritis in his lower spine. Fusion of two disarticulated hip bones with the tail bones may have been caused by degenerative changes. Nodules of bone on a number of cranial vault fragments were caused by benign tumours and would have had no detrimental effect.

The presence of Schmorl's nodes (axial stress lesions) and other traumatic lesions in the assemblage speaks of a physically arduous life for some of the population. Trauma to a number of ligaments and tendons were observed in a vertebra and hip. Further trauma occurred in the form of fractures, affecting a fibula, clavicle and humerus from the disarticulated assemblage and two ribs from Skeleton 17, all of which were well healed. Evidence for probable interpersonal violence was seen in a disarticulated cranium that showed no signs of healing.

Dental health appears to have been mixed, with over half of the teeth observed affected by dental plaque concretions, albeit generally slight deposits, which may suggest that some level of oral hygiene was attempted. Evidence of tooth decay was limited, but a small number of dentitions affected suggest some individuals had a diet high in sugars and carbohydrates. A small number of dental abscesses were also present in adults and non-adults. Unusually, the upper jaw of an older juvenile from Context 26 had a very large, internally draining, abscess, located at the roots of the right incisors and canine, which would have been painful and likely had a detrimental effect on the child's immune system.

6.0 FUTURE RECOMMENDATIONS

Considering little archaeological investigation has previously been undertaken in Askham Richard, limited information is known about the preservation of medieval and potentially earlier settlement activity. It is strongly recommended that at least one of the articulated burials undergoes AMS dating to establish the date of the burials and to place them within their archaeological context.

References

Aufderheide, A. C. and Rodríguez-Martín, C. 1998. *The Cambridge Encyclopedia of Human Paleopathology* (Cambridge)

Barnes, E. 2012. Atlas of Developmental Field Anomalies of the Human Skeleton: A Paleopathology Perspective (Colorado)

Barnes, E. 1994. *Developmental Defects of the Axial Skeleton in Palaeopathology* (Niwot, Colorado)

Bass, W. M. 1987. *Human Osteology: A Laboratory and Field Manual* (Columbia)

Bennett, K. A. 1965. 'The etiology and genetics of wormian bones', *American Journal of Physical Anthropology* 23: 255-260

Berry, A.C. and Berry, R.J. 1967. 'Epigenetic variation in the human cranium', *Journal of Anatomy* 101 (2): 361-379

Brothwell, D.R. 1981. *Digging Up Bones* (New York)

Buikstra, J.E. and Ubelaker D.H. (eds) 1994. *Standards for Data Collection from Human Skeletal Remains* (Fayetteville)

Cox, M. 2000. 'Ageing adults from the skeleton', in M. Cox and S. Mays (eds), *Human Osteology in Archaeology and Forensic Science* (London): 61-82

Finnegan, M. 1978. 'Non-metric variation of the infracranial skeleton', *Journal of Anatomy* 125: 23-37

Galloway, A. 1999a. 'Fracture patterns and skeletal morphology: The lower extremity', in A. Galloway (ed) Broken Bones: Anthropological Analysis of Blunt Force Trauma (Springfield, Illinois): 160-223

Hillson, S. 1996. *Dental Anthropology* (Cambridge)

Hilton, R.C., Ball, J. and Benn R.T. 1976. 'Vertebral end-plate lesions (Schmorl's nodes) in the dorsolumbar spine', *Annals of the Rheumatic Diseases* 35: 127-132

Jurmain, R. 1999. *Stories from the Skeleton* (London and New York)

Kennedy, K.A.R. 1989. 'Skeletal markers of occupational stress', in M.Y. Işcan. and K.A.R. Kennedy (eds), *Reconstruction of Life from the Skeleton* (New York):129-160

Larsen, C. S. 1997. *Bioarchaeology: Interpreting Behaviour from the Human Skeleton. Cambridge Studies in Biological and Evolutionary Anthropology* (Cambridge)

Lewis, M. E. 2000. 'Non-adult palaeopathology: current status and future potential', in M. Cox and S. Mays (eds) *Human Osteology in Archaeology and Forensic Science* (London): 39-57

Lewis, M. E. 2007. *The Bioarchaeology of Children: Perspectives from Biological and Forensic Anthropology* (Cambridge)

Lovell, N. C. 1997. 'Trauma analysis in paleopathology', *Yearbook of Physical Anthropology* 40: 139-170

Mays, S. and Cox, M. 2000. 'Sex determination in skeletal remains', in M. Cox and S. Mays (eds), *Human Osteology in Archaeology and Forensic Science* (London): 117-130

McKellar, R. D. 1940. 'Clay-shoveler's fracture' *Journal of Bone and Joint Surgery* 22: 63-75

McKinley, J. I. 2004. 'Compiling a skeletal inventory: disarticulated and co-mingled remains', in M. Brickley and J. I. McKinley (eds), *Guidelines to the Standards for Recording Human Remains. IFA Paper No. 7* (Southampton and Reading): 14-17

Moynihan, P. 2003. 'Diet and dental caries', in J. J. Murray, J. H. Nunn and J. G. Steele (eds) *The Prevention of Oral Disease* (Oxford): 9-34

Naudé, M., Lindeque, B. G.P. and Rensburg, D. C. J. V. 2003 'Avulsion fractures of the pelvis.' *South African Journal of Sports Medicine* 15(2):18-24

Ogden, A. R. 2008a. 'Periapical voids in human jaw bones', in M. Smith and M. Brickley (eds) *Proceedings of the 8th Annual Meeting of the British Association for Biological Anthropology and Osteoarchaeology*. *British Archaeological Reports International Series* 1743 (Oxford): 51-56

Ogden, A. R. 2008b. 'Advances in the paleopathology of teeth and jaws', in S. Mays and R. Pinhasi (eds) *Advances in Human Paleopathology* (Chichester): 283-307

Ortner, D. J. 2003. *Identification of Palaeopathological Disorders in Human Skeletal Remains* (Amsterdam and San Diego)

Oxenham, M. F and Cavill, I. 2010. 'Porotic hyperostosis and cribra orbitalia: the erythropoietic response to iron-deficiency anaemia' *Anthropological Science* 118 (3): 199-200

Regan, M. H., Case, D. T., and Brundige, J. C. 1999. 'Articular surface defects in the third metatarsal and third cuneiform: Nonosseous tarsal coalition', *American Journal of Physical Anthropology* 109: 53-65

Roberts, C.A. and Cox, M. 2003. *Health and Disease in Britain from Prehistory to the Present Day* (Stroud)

Roberts, C.A. and Manchester, K. 2005. *The Archaeology of Disease* (third edition) (Stroud)

Rogers, J. 2000. 'The palaeopathology of joint disease', in M. Cox and S. Mays (eds), *Human Osteology in Archaeology and Forensic Science* (London): 163-182

Saunders, S.R. 1989. 'Non-metric variation', in M.Y. Işcan and K.A.R. Kennedy (eds) *Reconstruction of Life from the Skeleton* (New York): 95-108

Sauer, N. J. 1998. 'The timing of injuries and manner of death: distinguishing among antemortem, perimortem and postmortem trauma', in K. Reichs (ed) *Forensic Osteology: Advances in the Identification of Human Remains* (Springfield): 321-332

Scheuer, L. and Black, S. 2000a. 'Development and ageing of the juvenile skeleton', in M. Cox and S. Mays (eds), *Human Osteology in Archaeology and Forensic Science* (London): 9-22

Scheuer, L. and Black, S. 2000b. *Developmental Juvenile Osteology* (San Diego)

Stone, R. J. and Stone, J. A. 1995. *Atlas of the Skeletal Muscles* (London)

Stuart-Macadam, P. 1992. 'Anemia in past populations', in P. Stuart-Macadam and S. Kent (eds) *Diet, Demography and Disease: Changing Perspectives of Anemia* (New York): 151-170

Sture, J. F. 2001. *Biocultural Perspectives on Birth Defects in Medieval Urban and Rural English Populations*, Unpublished PhD Thesis (Durham)

Tomczak, P.D. and Buikstra, J.E. 1999. 'Analysis of blunt trauma injuries: vertical deceleration versus horizontal deceleration injuries', *Journal of Forensic Sciences* 44 (2): 253-262

Trinkhaus, E. 1978. 'Bilateral asymmetry of human skeletal non-metric traits', *American Journal of Physical Anthropology* 49: 315-318

Trotter, M. 1970. 'Estimation of stature from intact limb bones', in T.D. Stewart (ed), *Personal Identification in Mass Disasters* (Washington D.C.): 71-83

Ubelaker, D.H. 1989. *Human Skeletal Remains*, 2nd Edition (Washington D.C.)

Walker, P. L., Bathurst, P. R., Richman, R., Gjerdrum, T. and Andrushko, V. A. 2009. 'The causes of porotic hyperostosis and cribra orbitalia: a reappraisal of the iron-deficiency-anemia hypothesis' *American Journal of Physical Anthropology* 139: 109-125

Zariņa, G., Sholts, S.B., Tichinin, A., Rudovica, V., Vīksna, A., Engīzere, A., Muižnieks, V., Bartelink, E.J. and Wärmländer, S.K., 2016. 'Cribra orbitalia as a potential indicator of childhood stress: Evidence from paleopathology, stable C, N, and O isotopes, and trace element concentrations in children from a 17th-18th century cemetery in Jekabpils, Latvia', *Journal of Trace Elements in Medicine and Biology*, *38*: 131-137

Zero, D. T. 1999. 'Dental caries process', *Dental Clinics of North America* 43: 635-664

APPENDIX A: OSTEOLOGICAL AND PALAEOPATHOLOGICAL CATALOGUE

Skeleton No	**17**															
Date	?															
Orientation	NE-SW															
Position	Supine extended															
Preservation	Surface preservation = 3 (moderate); slight fragmentation															
Completeness	90%															
Age	46+ years (mature adult)															
Sex	Male															
Stature	185.7 $^{+/-}$ 3.37cm															
Non-Metric Traits	*Ossicle at parietal notch* (right), *ossicle at asterion* (right), *mastoid foramen extra sutural* (right), *sutural mastoid foramen* (right), *Allen's fossa* (left), *hypo trochanteric fossa* (bilateral), *exostosis in trochanteric fossa* (left), *vastus notch* (left), *peroneal tubercle* (right), *lateral talar extension* (left)															
Pathology	DJC in the thoracic, lumbar and sacral spine, the left shoulder, the left hip, and left knee. OA in the thoracic and lumbar spine, and left ankle Vertebral border shift at the lumbar thoracic border. Healed oblique fractures to the angles of the 5th and 6th right ribs. Bilateral OD on the inferior, posterior talar facets															
Dental Health	16 tooth positions, 14 teeth present, 3 lost PM, calculus on 6/16 teeth, 3 caries, on three teeth, DEH on 7/16 teeth. Abscesses on the left mandible															
	Right Dentition								Left Dentition							
Present	-	-	-	-	-	-	-	-	P	-	-	-	-	-	-	-
Calculus	-	-	-	-	-	-	-	-	Fb md	-	-	-	-	-	-	-
DEH	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Caries	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Wear	-	-	-	-	-	-	-	-	5	-	-	-	-	-	-	-

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**	**e**	**6**	**7**	**8**
Present	P M	P	P	PM	P	P	P	P	P	P	P	P	P	PM	P	P
Calculus	-	-	-	-	Sd	Fb	-	-	Fd	Fb	-	-	-	-	Fm	-
DEH	-	-	-	-	-	G	G	G	G	G	G	G	-	-	-	-
Caries	-	-	Lm	-	-	-	-	-	-	-	-	-	Sd	-	Md	-
Wear	-	5	5	-	4	3	3	3	4	3	4	4	5	-	5	5

Skeleton No	**19**
Date	?
Orientation	NE-SW
Position	Supine extended
Preservation	Surface preservation = 2 (Good); slight fragmentation
Completeness	50%
Age	46+ years (mature adult)
Sex	Male
Stature	165.2 $^{+/-}$ 2.99cm
Non-Metric Traits	*Femoral plaque* (bilateral), *hypo trochanteric fossa* (left), *exostosis in trochanteric fossa* (bilateral), *third trochanter* (bilateral), *vastus notch* (bilateral), *vastus fossa* (bilateral), *lateral tibial squatting facet* (right), *lateral talar extension* (bilateral)
Pathology	DJC in both hips, and both knees. Vertebral border shift at the sacro-coccygeal border. Bilateral porosity on calcanei
Dental Health	0 tooth positions, 0 teeth present

Skeleton No	**20**
Date	?
Orientation	NE-SW
Position	Supine extended
Preservation	Surface preservation = 4 (Poor); slight fragmentation
Completeness	40%
Age	46+ years (mature adult)
Sex	Female
Stature	165.0 $^{+/-}$ 3.72cm
Non-Metric Traits	*Ossicle at parietal notch* (right), *ossicle at asterion* (right), *mastoid foramen extra sutural* (right), *sutural mastoid foramen* (right), *Allen's fossa* (left), *hypo trochanteric fossa* (bilateral), *exostosis in trochanteric fossa* (left), *vastus notch* (left), *peroneal tubercle* (right), *lateral talar extension* (left)
Pathology	
Dental Health	0 tooth positions, 0 teeth present.

KEY:

Present - Tooth presence; am - ante-mortem tooth loss; pm - post-mortem tooth loss; p - tooth present; - - jaw not present; o – erupting. 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

Appendix B: Disarticulated Human Bone Catalogue

Context	Bone Element	Bone	Side	% of Bone	SP	No of Frag	Age	Sex	Other
2	Skull	Frontal (R orbit and squamous part)	R	50	5+	1	A	F	
2	Rib	2nd or 3rd lateral part	L	40	1	1	A	-	
2	Phalanx	Proximal manual phalanx	-	90	1	1	A	-	
2	Humerus	Mid-shaft	L	30	3	2	A	-	
2	Tibia	Unsided proximal fragment	-	20	4	1	A	-	
2	Humerus	Proximal artic, proximal and mid-shaft	R	50	1	1	A	-	DJC: O= 2,
2	Femur	Proximal shaft and mid shaft, missing proximal articulation,	L	40	3	2	A	-	
2	Femur	Mid shaft	-	20	3	1	A	-	
2	Femur	Greater trochanter	R	5	2	1	A	-	
2	Long bone fragments	Unidentifiable fragments	-	10	4	2	A	-	
2	Os-coxa	Ilium frag, part of auricular surface and acetabulum	R	40	4	1	A	-	
2	Os-coxa	Ilium, squamous part	R	30	3	1	A	-	
2	Skull	Temporal, zygomatic arch and mart of mastoid	L	10	5	1	A	-	
2	Skull	Vault fragments	-	5	4	4	A	-	
2	Skull	Parietal squamous part	R	60	3	1	A	-	
2	Sacrum	complete	-	100	1	1	A	M??	The 1st coccygeal vertebra was fused to the base of the sacrum.
2	Humerus	Distal and mid-shaft	L	60	2	1	A	-	-
4	Ulna	Proximal articulation and proximal shaft	L	20	3	1	A	-	
4	Ulna	Mid and distal shaft and distal articulation	R	30	2	1	A	-	
4	Vertebra	Thoracic T2	-	100	1	1	A	-	
4	Vertebra	Thoracic T2? complete Arch, no body	-	50	1	1	A	-	
4	Skull	Temporal, petrous portion	L	20	1	1	A	-	
4	Skull	TMJ, and part of zygomatic arch	R	10	2	1	A	-	
4	Skull	Parietal vault fragments	-	10	4	22	A	-	

4	Humerus	Midshaft	-	20	3	1	J		
4	Skull	Temporal, petrous portion and mastoid	L	20	2	1	A	F?	
4	Skull	Temporal, squamous part and parietal articulation	-	10	3	1	A	M?	
4	Skull	Temporal, TMJ	R	5	2	1	A	-	-
4	Skull	Sphenoid greater wing	R	40	2	1	A	-	
4	Skull	Sphenoid greater wing	R	30	2	1	A	-	
4	Metatarsal	MT1 shaft and half of the proximal articulation	R	70	5	1	A	-	
4	Phalanx	Proximal manual phalanx	-	100	1	1	A	-	
4	Phalanx	Proximal pedal phalanx for MT1	R	100	1	1	A	-	
4	Tibia	Proximal, medial half of articulation	L	10	3	1	A	-	
4	Rib	Lateral shaft of 2^{nd} or 3^{rd} rib	R	20	2	1	A	-	
4	Skull	Temporal, TMJ	R	10	3	1	A	-	
4	Rib	Neck and shaft, missing head and sternal end	L	70	3	1	J	-	Transverse process articulation un fused
4	Humerus	Mid and distal shaft, distal articulation incomplete	L	50	3	1	A	-	
4	Humerus	Proximal articulation and proximal shaft	R	40	1	1	YA	-	Epiphyseal line still visible, but well fused
4	Scapula	Lateral border, and glenoid	L	40	3	1	J	-	
4	Skull	Frontal, L+R parietal, L+R maxilla, R mandible	R	60	3	7	A	F?	24 tp, 9 teeth, 13 lost PM, 1 max L 3^{rd} molar and mand R 3^{rd} molar NP, slight to moderate deposits on 9/9 teeth, slight periodontal disease on mandible and maxilla, slight wear. Cribra R orbit G=2, endocranial lamellar bone, grey and porotic across squamous part of frontal, and sagittal sulcus between parietals. NMT bridging of supra-orb notch (L)
4	Skull	Frontal	-	90	2	1	A	M?	Fibrous lamellar bone across the endocranial surface of the frontal
4	Skull	Occipital + Sphenoid, basilar part, occipital condyles	-	10	3	1	A	-	
4	Skull	Parietal (L+R), occipital (superior half)	-	40	3	3	A	-	
4	Skull	Bregma, region of parietals and skull	-	10	3	1	A	-	NMT metopic suture

4	Skull	Occipital superior part, inc cruciform em	-	70	1	1	A	-	-
4	Skull	Occipital superior part, inc cruciform em	-	50	5	1	A	-	Lamellar bone on transverse sinus
4	Skull	Frontal, squamous and R orbit	R	80	3	1	A	-	Button osteoma above R orbital ridge, 5mm in diameter, defined edges
4	Skull	Frontal, medial margins of both orbits	-	10	2	2	A	-	NMT metopic suture
4	Skull	Occipital superior part, inc cruciform em	-	70	3	2	J	-	Woven bone in sagittal sinus
4	sacrum	S1, body and R ala, fusing	R	20	2	1	J	-	Body and R ala, fusing
4	Skull	Maxilla	L	100	1	1	J	-	5 TP, 3 teeth, 2 lost PM, slight calculus on one tooth, deciduous M1 and 2 still in dentition, perm M1 erupted and in occlusion
4	Long bone	Shaft fragments	-	5	2	5	A	-	
4	Skull	Maxilla	R	70	3	1	A	-	6 TP, 5 teeth, 1 lost PM, calculus flecks on 2 teeth
4	Vertebra	2nd cervical	-	100	1	1	A	-	
4	Vertebra	2nd cervical	-	100	1	1	A	-	
4	Vertebra	2nd cervical, missing spinous process	-	90	1	1	A	-	
4	Vertebra	1st cervical	-	100	2	1	A	-	
4	Vertebra	1st thoracic	-	100	1	1	A	-	
4	Vertebra	Lumbar, left side of body and L superior arch	-	70	1	1	A	-	
4	Fibula	Mid-shaft	-	30	3	1	A	-	
4	Os-coxa	Ilium and superior half of ischium, inc acetabulum	R	70	4	2	F?	-	
4	Zygoma	Lateral half	R	50	2	1	J	-	
4	Temporal	TMJ	L	10	4	1	A	-	
4	Rib	shafts	-	20	2	6	A	_	
4	Rib	Middle order rib head	L	10	1	2	A	-	
4	Os coxa	Ischiopubic ramus	L	20	2	1	YA/ Juv	F?	Fusing
4	Femur	Distal articulation and distal shaft	R	20	2	1	A	-	
4	Femur	Distal articulation and distal shaft	L	30	3	1	A	-	
4	Femur	Distal articulation and distal shaft	L	20	3	1	A	-	

4	Femur	Proximal articulation	R	5	2	1	A	-	
4	Femur	Greater trochanter	R	5	2	1	A	-	
4	Femur	Proximal articulation, greater trochanter and proximal shaft	R	25	2	1	A	-	
4	Femur	Proximal articulation and lesser trochanter	L	15	3	1	A	-	
4	Femur	Proximal articulation, lesser trochanter and proximal shaft	L	30	2	1	A	-	Ap=26.6 ml=32.6
4	Femur	Proximal articulation, lesser and greater trochanter and proximal shaft	L	55	3	1	A	-	Ap=26.8 ml=33.8
4	Tibia	Distal articulation only	R	10	1	1	A	-	Lateral squatting facet
4	Tibia	Missing distal articulation only	L	90	3	1	A	-	Striated lamellar bone along entire medial shaft ap=34.3 ml=25.6
4	Humerus	Proximal articulation, proximal and mid-shaft	R	50	2	1	YA	-	Epiphyseal line still visible, but well fused
4	Humerus	Distal articulation	L	20	3	1	A	-	
4	Humerus	Distal articulation and distal shaft	L	40	3	1	A	-	
4	Humerus	Proximal and mid-shaft	R	50	2	1	A	-	
4	Ulna	Proximal articulation, proximal shaft	L	30	1	1	A	-	-
4	Ulna	Distal articulation and distal ½ of shaft	L	10	3	1	A	-	
4	Metatarsal	MT2 proximal articulation and prox shaft	R	50	3	1	A	-	
4	Humerus	Distal shaft and articulation	R	50	2	1	I	-	
4	Radius	Distal articulation	L	5	4	1	A	-	-
4	Ulna	Midshaft	L	40	1	1	A	-	-
6	Skull	Mandible, anterior part to mental foramen	L	20	1	1	A	M?	8TP, 5 teeth, 3 lost PM, flecks of calculus on 5 teeth, minimal wear
6	Skull	Vault fragment	-	5	3	1	A	-	
6	Skull	Frontal, R orbit	R	5	4	1	A	-	-
6	Skull	Central incisor	L	100	2	1	A	-	Slight wear
6	Skull	Sphenoid, body	-	20	2	1	A	-	
6	Femur	Shaft fragment	-	5	4	1	A	-	
6	Rib	Head and neck	R	20	2	1	A	-	
5	Skull	Parietal	L	90	4	1	A	-	Ossicle in lambdoid

5	Skull	Occipital	L	40	4	1	A	-	-
5	Skull	Temporal TMJ	R	10	2	1	A	-	
5	Skull	Parietal vault fragments	-	20	3	11	A	-	
5	Skull	Frontal, posterior squamous part	R	20	1	1	J	-	
5	Skull	L+R frontal, L+R zygoma, L+R maxilla, L+R parietal	-	70	2	5	MA	F	Fibrous HFI like lobules on the endo cranial surface of the frontal (early stages), 16 TP, 11 teeth, 3 teeth lost pm2 teeth NP (3rd Molars), moderate to heavy wear, flecks to moderate deposits of calculus on 11 teeth, moderate periodontal disease.
5	Skull	Mandible R, side missing condyle	R	50	4	1	A	-	5 TP, 3 teeth, 2 lost PM, heavy wear on m1, moderate om m1, small caries on medial and distal crown of M1, slight periodontal disease, 2 teeth with flecks of calculus
5	Skull	Mandible L, side missing condyle	L	50	4	2	J	-	7 TP 4 teeth, 2 teeth lost PM, M3 still decid m2 still in jaw, perm M1 and m2 erupted, slight wear on perm M1, is decid retained??
5	Skull	Frontal, orbit	L	10	2	1	A	F?	
5	Skull	Temporal, petrous portion and mastoid, Lateral part of occipital	R	30	3	1	A	-	Sutural mastoid foramen, ossicle at asterion
5	Skull	Temporal, origin of mastoid only	R	5	1	1	A	-	
5	Skull	Temporal, missing squamous part	R	50	3	1	A	-	
5	Skull	Temporal, petrous part	R	10	1	1	A	-	
5	Skull	Occipital, basilar and parts lateralis	-	10	1	1	A	-	
5	Skull	Temporal, TMJ	R	10	2	1	A	-	
5	Skull	Occipital, posterior edge of foramen magnum	-	5	2	1	A	-	
5	Os coxa	Ilium and ischium	R	70	1	1	A	-	
5	Os coxa	Ilium and ischium	L	60	1	2	YMA	-	Auric surface course granularity and striae
5	Os coxa	Ilium	R	30	3	1	J	-	
5	Vertebrae	Lumbar L1-4	-	100	2	4	A	-	L1-3 have Schmorl's nodes on inferior and superior surfaces, DJC= Og2 on inferior facets of L2, superior and inferior facets of L3, and

									inferior facets of L4. OA on inferior L facet of L3, porosity g2 on inferior facets of L3
5	Vertebrae	Thoracic T12-10	-	100	2	3	A	-	Schmorl's nodes on inferior and superior surfaces
5	Vertebrae	ThoracicT9-5	-	100	2	5	A	-	Schmorl's nodes on inferior and superior surfaces T9-8, and inferior surfaces only of T6-7
5	Vertebrae	Thoracic T1/2	-	100	1	1	A	-	
5	Vertebrae	Cervical C7 arch only	-	50	2	1	A	-	Possible clay shoveller's fracture, distal end missing
5	Vertebrae	Thoracic arch	-	50	3	1	A	-	
5	Vertebrae	Lumbar L4/5, missing superior facets	-	90	4	1	A	-	DJC P=g3
5	Rib	Second rib, missing sternal end	R	70	1	1	A	-	
5	Rib	X 8 rib necks	R	20	2	8	A	-	
5	Rib	X 9 rib necks	L	20	2	9	A	-	
5	Rib	Shaft fragments	-	10	2	12	A	-	
5	Talus	complete	R	100	2	1	A	-	
5	Scapula	Missing medial and inferior border	R	80	2	1	A	-	NMT scapular foramen.
5	Metacarpal	MC3, missing styloid	R	95	2	1	A	-	DJC=Central osteophytes on distal articulation G2
5	Metatarsal	MT1, complete	L	100	2	1	A	-	
5	Radius	Tuberosity, proximal and mid-shaft	L	40	3	1	A	-	
5	Fibula	Distal and mid-shaft	R	50	2	2	A	-	
5	Fibula	Distal articulation and distal shaft	L	30	4	1	A	-	
5	Ulna	Missing distal 3rd	R	70	3	2	A	-	
5	Ulna	Proximal articulation only	L	10	1	1	A	-	
5	Ulna	Proximal and mid-shaft, missing prox artic	L	60	1	1	A	-	
5	Femur	Proximal articulation, and proximal shaft	R	30	2	1	A	-	Ap=28.6 ml=32.6
5	Femur	Proximal articulation, fragment	-	5	1	1	A	-	
5	Femur	Proximal articulation	-	5	2	1	A	-	
5	Femur	Missing greater and lesser trochanter and distal articulation	R	80	4	1	A	-	
5	Femur	Distal 3rd of shaft and part of distal articulation	L	30	4	1	A	-	

5	Humerus	Deltoid on mid-shaft to distal shaft	R	50	2	1	A	-	
5	Humerus	Distal shaft and distal articulation	R	40	2	1	A	-	
5	Humerus	Complete except for the trochanters and superior margin of the proximal artic	R	90	2	2	A	-	
5	Humerus	Missing proximal articulation	L	90	1	2	A	-	
5	Humerus	Distal half of shaft and distal articulation	L	50	4	1	A	-	
5	Scapula	Origin of acromion	L	10	2	1	A	-	
5	Tibia	Distal articulation and distal third of shaft	L	30	3	1	A	-	
5	Tibia	Distal articulation and distal half of shaft, missing medial malleolus	L	50	3	1	A	-	NMT lateral squatting facet
5	Tibia	Proximal, mid, and distal shaft	L	80	4	1	A	-	-
5	Clavicle	Medial end of shaft, missing articulation	L	40	2	1	A	-	-
5	Femur	Midshaft	-	10	5	1	A	-	-
7	Metacarpal	Missing proximal end	L	90	1	1	A	-	Possible trauma, fracture? With potential fusion to carpal (trapezoid) secondary to trauma. (incomplete)
7	Tibia	Medial surface of proximal facet	L	<5	2	1	A	-	-
7	Fibula	Complete	L	100	2	1	A	-	Max length = 40.3cm
7	Fibula	Mid-shaft fragment	-	5	1	1	A	-	
7	Calcaneus	Complete	L	100	1	1	A	-	NMT double anterior calcaneal facet, and peroneal tubercle
7	Metatarsal	MT1	L	100	1	1	A	-	-
7	Humerus	Distal articulation and half of distal shaft	L	20	4	1	A	-	
7	Humerus	Distal third of shaft, missing the articulation	L	20	3	1	A	-	
7	Os-coxa	Inferior part of ilium, and part of auricular surface.	L	20	2	1	YMA-OMA	-	Striae present on superior demiface, densification evident
7	Rib	Middle order rib neck	R	10	1	1	A	-	
7	Rib	Shaft fragments	-	10	2	4	A	-	
7	Phalanx	Proximal manual phalanges x3 complete	-	100	2	3	A	-	
7	Phalanx	Proximal manual phalanx for MT1	-	100	3	1	A	-	

7	Femur	Proximal, mid and distal shaft and lateral distal articular surface	R	70	2	2	A	-	
7	Femur	Proximal articulation and proximal shaft	R	30	2	1	A	-	Femoral head diameter= 47.4mm ap =27.1 ml=33.4
7	Femur	Mid shaft	-	30	2	1	?	-	-
7	Femur	Proximal shaft and unfused metaphyses	L	20	1	1	OJ	-	Based on size
7	Femur	Proximal, mid and distal shaft	L	70	3	1	YJ	-	-
7	Tibia	Mid shaft	-	30	1	1	N/I	-	-
7	Vertebra	C1	-	100	4	1	A	-	-
7	Vertebra	Thoracic middle order	-	100	2	1	A	-	DJC, osteophytes and porosity grade 2 on superior, Schmorl's node on inferior body
7	Vertebra	Thoracic middle order, missing inferior facets	-	90	2	1	A	-	DJC, osteophytes and porosity grade 2 on superior, Schmorl's node on inferior body
7	Vertebra	Thoracic middle order, missing anterior half of body	-	80	2	1	A	-	-
7	Vertebra	T11	-	100	1	1	A	-	DJC, osteophytes grade 3 on superior and inferior body, and porosity grade 2 on inferior, Schmorl's node on inferior body
7	Vertebra	Lumbar arch only, (L2?) all facets present	-	40	1	1	A	-	-
7	Vertebra	Lumbar arch only, (L4?) inferior L facet present	L	10	2	2	A	-	
7	Skull	Occipital	-	100	3	1	A	-	NMT ossicles in lambdoid on L side
7	Skull	Frontal	-	100	3	1	A	M??	Cribra in right orbit, grade 2 area 1&2
7	Skull	Parietal	R	100	3	1	A	-	
7	Skull	Parietal vault fragments	-	20	3	22	A	-	-
7	Skull	Frontal, L orbit only	L	10	2	1	I	-	-
7	Skull	Temporal, TMJ only	R	5	2	1	J	-	-
7	Skull	Temporal, R greater wing of Sphenoid and basilar of occipital	R	30	2	1	-	M??	-
7	Skull	Temporal, mastoid and petrous only	R	30	2	1	AO-YMA	-	Jugular growth plate unfused ADO < 34
7	Skull	Temporal, mastoid and petrous only	R	30	3	1	A	F??	Jugular growth plate fused 22+

7	Skull	Occipital condyle	L	5	2	1	A	-	
7	Metacarpal	MC 2 or 3Missing proximal articulation	L	80	1	1	A	-	Myositis ossificans traumatica on inferior surface of proximal end of shaft
8	Skull	Parietal. Posterior half	R	50	4	1	A	-	
8	Skull	Parietal, L & R	-	90	4	4	A	-	
8	Skull	Temporal, petrous only	R	30	2	1	A	-	
8	Skull	Temporal, TMJ and part of squamous region	R	20	4	1	A	-	-
8	Skull	Parietal vault fragments	-	10	2	7	A	-	
8	Rib	Mid-shaft	R	10	2	1	A	-	
8	Phalanx	Proximal manual phalanx	-	100	1	1	A	-	
8	Ulna	Distal articulation and distal ¼ of shaft	R	20	2	1	A	-	
8	Ulna	Mid-shaft	R	30	2	2	A	-	
8	Radius	Mid-shaft	-	20	2	1	A	-	
9	Skull	Frontal, L zygoma, L maxilla, both parietals, occipital and L temporal	-	70	4	4	A	F?	Jugular growth plate fused 22+ NMT sutural mastoid foramen. 7 TP, 3rd molar NP, 1 tooth lost PM, 5 teeth, flecks of calculus on 2 teeth, slight to moderate wear,
9	Skull	Frontal, L orbit	L	20	2	1	A	M??	-
9	Skull	Frontal, supraorbital ridges only	-	20	4	1	A	M??	Button osteoma above R supraorbital ridge, 4mm in diameter
9	Skull	Frontal, posterior part, in suture	-	30	4	1	A	-	-
9	Skull	Parietal vault fragments	-	10	1	2	J	-	-
9	Tibia	Shaft fragments	-	5	2	3	A	-	-
9	Fibula	Mid-shaft	-	10	3	1	A	-	-
9	Femur	Missing trochanters and distal articulation	R	80	3	1	A	-	-
9	Femur	Proximal articulation and trochanters	R	20	2	1	A	-	NMT exostosis in troch fossa
9	Tibia	Distal half of shaft and distal articulation	R	40	2	1	A		
9	Tibia	Mid-shaft fragment	R	10	2	1	A		
9	Tibia	Missing distal articulation	R	80	2	1	ADO-YA	-	Ap=33.7 ml= 22.2, lamellar bone along medial surface of midshaft (89.1si x 21.2mm ml), epiphyseal line still visible

9	Tibia	complete	L	100	2	1	AD O-YA	-	AP=33.1, ml= 22.3, Proximal epiphyseal line still visible NMT lateral squatting facet
9	Tibia	Distal articulation and ½ of distal shaft	L	20		4	1	A	-
9	Os-Coxa	Ilium, complete	R	100	1	1	YA-YM A	F??	Preauricular sulcus, Iliac crest, epiphyseal line still present
9	Vertebra	T12	-	100	3	1	A	-	DJC, g2 osteophytes on inferior and superior body, as well as Schmorl's nodes
9	Vertebra	T10-11 missing left facets	-	90	2	1	A	-	-
9	Vertebra	Mid thoracic, body and arch but only superior left facet present	-	80	2	1	A	-	
9	Vertebra	C2, body and odontoid ad left superior facet	-	40	2	1	A	-	
9	Scapula	Origin of acromion and superior lateral border	R	20	4	1	A	-	
9	Metacarpal	MC3 complete	R	100	0	1	A	-	
9	Humerus	Distal articulation, and distal 1/3 of shaft	R	30	2	1	A	-	NMT septal aperture
9	Humerus	Distal articulation	R	20	3	1	A	-	
9	Phalanx	Manual proximal, shaft only	-	70	3	1	A	-	
9	Rib	Middle order head and neck	R	20	2	1	A	-	
9	Rib	Shafts	-	20	3	3	A	-	
9	Unidentifiable long bone fragment	Shaft fragment	-	5	2	1	A	-	-
10	Skull	L side of frontal, L parietal, L zygoma, L temporal and occipital	L	40	3	9	A	M	Jugular growth plate fused 22+, remodelled lamellar bone in cruciform eminence, sagittal sulcus, lamellar bone, periosteal ectocranial reaction (orange peel) on centre of parietals and occipital. NMT ossicles in lambdoid
10	Rib	Shaft and sternal end	-	20	2	1	A	-	
10	Ulna	Distal shaft fragment	-	10	2	1	A	-	
10	Sphenoid	Greater wing	L	40	1	1	A	-	
10	Humerus	Complete	R	100	3	2	A	-	Max length=37.4cm
10	Humerus	Mid- shaft fragment (deltoid)	L	10	2	1	A	-	

10	Humerus	Lateral distal condyle	L	10	2	1	A	-	
10	Humerus	Distal and mid- shaft fragment	L	50	4	1	A	-	
10	Scapula	Lateral border and inferior ½ of glenoid	L	10	2	1	A	-	-
10	Scapula	acromion	R	10	1	1	A	-	
10	Scapula	Origin of acromion	R	5	3	1	A	-	
10	Scapula	Origin of acromion	L	5	2	1	A	-	
10	Os-coxa	Auricular surface	L	5	2	1	MA	-	Dense, irregular surface
10	Radius	Distal and mid-shaft	R	60	5+	1	A	-	
10	Radius	Proximal articulation, and proximal shaft	R	30	3	1	A	-	
10	Phalanx	Proximal manual phalanx	-	100	1	1	A	-	
11	Skull	Parietal fragment	-	5	4	1	A	-	
11	Fibula	Proximal ¼ of shaft	R	10	3	1	A	-	Well healed oblique fracture to proximal shaft the with anterior and inferior displacement of the proximal part
11	Ulna	Distal 1/8 of shaft and articulation	R	10	2	1	A	-	
11	Humerus	Distal third of the shaft	L	30	2	2	A	-	
11	Femur	Proximal shaft fragment	L	10	2	1	A	-	
11	Ulna	Distal ½ of shaft	L	50	4	1	J	-	
12	Femur	Distal articulation	R	10	5+	1	A	-	
12	Ilium	Missing part of iliac spine	L	90	5	3	I	-	
12	Rib	Neck and head of lower order	L	20	1	1	A	-	
12	Rib	Shaft fragments	-	10	2	3	A	-	
12	Skull	Frontal, posterior squamous part, including suture	L	20	3	1	A	-	Button osteoma, close to the coronal suture 7mm in diameter, well integrated to the surface
12	Skull	R maxilla and R zygoma	R	20	3	1	A	-	2 TP, 1 tooth, I tooth lost PM, heavy wear on m1
12	Femur	Proximal articulation	R	10	3	1	A	-	
12	Humerus	Mid-shaft (deltoid)	L	10	2	1	A	-	
13	Metatarsal	MT4 missing distal articulation	R	80	2	1	A	-	-
13	Rib	Heads and necks lower order X 3	R	20	2	3	A	-	
13	Rib	Shafts X4	-	10	2	4	A	-	

13	Rib	Middle order shaft fragment	R	20	3	1	J	-	
13	Humerus	Mid-shaft (deltoid)	L	30	4	1	A	-	
13	Humerus	Mid-shaft (deltoid)	R	30	4	1	A	-	
13	Humerus	Distal articulation and distal ¼ of shaft	L	20	2	1	A	-	
13	Radius	Missing proximal and distal articulations	L	80	5+	1	J	-	
13	Radius	Radial tuberosity fragment	R	10	5	1	J	-	
13	Radius	Distal half of shaft and distal articulation	R	40	3	1	A	-	
13	Radius	Distal 1/4of shaft and distal articulation	R	30	3	1	A	-	
13	Radius	Proximal articulation and proximal and mid shaft	L	70	3	1	A	-	
13	Radius	Mid-shaft	R	20	2	1	A	-	
13	Ulna	Proximal articulation and proximal shaft	L	30	3	1	J	-	
13	Femur	Mid & distal shaft	L	60	3	1	I/YJ	-	
13	Tibia	Missing proximal and distal articulations	R	70	5+	2	A	-	
13	Tibia	Proximal articulation and proximal shaft	R	40	4	1	A	-	
13	Vertebra	LumbarL1, complete	-	100	3	1	A	-	Schmorl's node on superior and inferior body
13	Vertebra	Mid thoracic, missing spinous process	-	90	2	1	A	-	Schmorl's node on superior and inferior body
13	Vertebra	Mid thoracic, missing superior body	-	90	3	1	A	-	Schmorl's node on inferior body
13	Tibia	Fragment of proximal articulation	-	5	2	1	A	-	
13	Scapula	Inferior and medial border	L	10	2	2	A	-	-
13	Scapula	Lateral border	R	5	2	1	A	-	-
13	Os-coxa	Ilium, superior half of auricular surface, and retro auricular area	R	20	2	2	MA	-	Surface entirely dense and inactive
13	Os-coxa	Ilium, lateral half of squamous part	L	10	2	1	A	-	
13	Skull	Parietal and posterior part of squamous frontal, including suture	L	20	4	5	J	-	
13	Skull	Occipital, and posterior halves of parietals	-		4	6	A	-	X2 Peri mortem sharp force trauma on posterior-medial-superior portion of L parietal. 1=38.4mm l x 9.3mm w. cut is orientated antero-lateral posterior-medial. Sharp smooth

									edge is posterior, with roughened irregular edge anterior. 2= is 5mm medial of 1st. measures 25.6mm l x 7.1mm w. cut is orientated more coronally than 1st but still has a antero-lateral posterior-medial orientation. Sharp smooth edge is anterior, with roughened irregular edge posterior. Both lesions cut into the diploe but leave the inner table untouched
13	Skull	Mandible, missing condyles	-	90	3	1	A	-	16 tooth positions 13 teeth, (L M3 NP) 2 lost PM slight to moderate calculus on 13/13 teeth, heavy wear, slight periodontal disease
13	Skull	Frontal, L orbit and squamous part	L	40	2	1	A	-	-
13	Skull	Occipital, basilar and L condyle	L	10	1	1	A	-	-
13	Skull	Occipital, basilar and condyles	-	15	1	3	A	-	NMT= double anterior foramen (R)
13	Skull	Frontal Fragments posterior squamous parts	-	10	1	2	A	-	-
13	Skull	Occipital, both parietals and L temporal	-	50	1	9	A	M	
14	Rib	2nd rib, missing sternal end	R	60	2	1	A	-	
14	Rib	Middle order, neck only	R	10	2	1	A	-	
14	Os-coxa	Ilium, lateral border	L	20	3	1	A	-	
14	Skull	Parietal occipital border	L	5	3	1	A	-	
14	Os-coxa	Ischio-pubic ramus	L	5	2	2	A	-	
14	Femur	Proximal shaft only	L	20	3	1	A	-	Ap= 27.6 ml=37.7
14	Radius	Missing proximal articulation	R	70	3	1	A	-	
15	Femur	Mid-shaft fragment	-	10	3	1	A	-	
15	Fibula	Mid-shaft fragment	-	10	2	1	A	-	
15	Humerus	Distal shaft fragment	R	30	1	1	A	-	
16	Humerus	Distal articulation, mid and distal shaft	R	60	5+	1	A	-	
16	Humerus	Distal articulation, proximal, mid and distal shaft	L	80	4	1	A	-	
16	Humerus	Distal and mid shaft only	R	50	4	1	A	-	
16	Skull	Maxilla fragment, posterior alveolar border only	R	5	2	1	A	-	2 tooth positions, 2 teeth, moderate wear

16	Skull	Temporal, missing squamous part	L	50	3	2	A	M?	Jugular growth plate fused 22+ years
16	Vertebra	Mid thoracic, neural arch, all facets	-	40	2	1	A	-	DJC= porosity grade 2 on inferior facets
16	Metatarsal	MT2, missing part of the proximal articulation	L	90	2	1	A	-	-
16	Metacarpal	Shaft only possibly MC5	-	60	5+	1	A	-	
16	Fibula	Proximal and mid-shaft	R	40	5+	1	A	-	
18	Skull	Posterior part of frontal, and anterior part of parietal	R	10	5	1	A	-	
18	Calcaneus	Lateral surface of body abraded	L	90	1	1	A	-	
18	Talus	complete	L	100	1	1	A	-	
18	Phalanx	Proximal phalanx for MT1	L	100	1	1	A	-	
18	Phalanx	Proximal phalanx for MT1	R	100	1	1	A	-	
18	Hamate	complete	L	100	1	1	A	-	
18	Metatarsal	MT1	R	100	1	1	A	-	
18	Metatarsal	MT3	R	100	4	1	A	-	
18	Metatarsal	MT4, missing distal articulation	R	90	2	1	A	-	
18	Metatarsal	MT5, missing distal articulation	R	90	2	1	A	-	
18	Metatarsal	MT3	L	100	2	1	A	-	
18	Metatarsal	MT3	R	100	2	1	A	-	
18	Metatarsal	MT4, missing distal articulation	R	80	3	1	A	-	
18	Femur	Proximal shaft fragments	L	5	3	2	A	-	
18	Rib	Sternal end	L	20	3	1	J	-	
19	Metacarpal	MC1	L	100	1	1	A	-	
19	Metacarpal	MC2	R	100	1	1	A	-	
19	Metacarpal	MC2, missing distal articulation	L	90	1	1	A	-	
19	Metacarpal	MC3	L	100	1	1	A	-	
19	Metacarpal	MC5	R	100	1	1	A	-	
19	Metacarpal	MC4	L	100	1	1	A	-	
19	Metacarpal	MC3	R	100	1	1	A	-	
19	Metacarpal	MC3	L	100	1	1	A	-	
19	Metacarpal	MC2	L	100	1	1	A	-	

19	Metacarpal	MC4, missing distal articulation	L	90	1	1	A	-	
19	Metacarpal	MC4	R	100	2	1	A	-	
19	Metacarpal	MC5, shaft only	-	80	3	1	A	-	
19	Metacarpal	MC5, shaft and proximal articulation	L	90	3	1	A	-	
19	Phalanx	Proximal phalanx for MT1	L	100	1	1	A	-	
19	Phalanx	Proximal phalanx for MT1	L	100	1	1	A	-	
19	Phalanx	Proximal phalanx for MT1	R	100	1	1	A	-	
19	Phalanx	X4 proximal manual phalanges	-	100	2	4	A	-	
19	Humerus	Distal articulation only	R	10	1	1	A	-	
19	Radius	Distal articulation and distal third of shaft	R	30	2	2	A	-	
19	Humerus	Distal and mid-shaft, and distal metaphysis	R	60	3	1	YJ	-	
19	Femur	Shaft only	L	70	3	1	I	-	
19	Ulna	Distal articulation and distal third of shaft	R	30	1	1	A	-	
19	Rib	Neck and head only, middle order	R	10	1	1	A	-	
19	Skull	Mandible anterior-inferior surface	-	5	5	1	A	-	
19	Skull	Parietal anterior and medial posterior	R	60	2	2	A	-	
19	Skull	Occipital, posterior part of foramen magnum	-	5	4	1	A	-	
19	Scapula	Lateral-inferior border	R	10	3	1	A	-	
19	Vertebra	Body only (L1?)	-	50	2	1	A	-	DJC osteophytes grade=3
19	Os-coxa	Ilium and ischium (missing squamous part of ilium)	R	50	1	1	MA	F	Auricular surface= irregular and macroporotic. DJC acetabulum osteophytes grade=2, porosity grade=2
19	Os-coxa	Ilium and ischium (missing superior squamous part of ilium)	R	60	2	1	MA	M	Auricular surface= irregular and macroporotic. DJC acetabulum osteophytes grade=2, porosity grade=2. OA in acetabulum, eburnation grade=1
19	Sacrum	Ala only	L	10	2	1	A	-	-
19	Metatarsal	MT5, Proximal half	R	50	3	1	A	-	
19	Metatarsal	MT4, Proximal half	R	50	3	1	A	-	
19	Femur	Entire shaft and distal metaphysis	L	70	4	1	A	-	
19	Femur	Entire shaft and anterior portion of distal	L	80	2	2	A	-	

		articulation							
19	Femur	Complete	R	100	1	2	A	-	DJC= osteophytes grade 2 on distal and proximal articulation, and central osteophytes grade =1 on distal and proximal artic. NMT= hypotrochanteric fossa, and exostosis in the trochanteric fossa. Ap= 28.2, ML=34.6mm
19	Tibia	Shaft only	R	70	5	1	A	-	-
20	Sacrum	Missing left ala	-	90	2	1	A	-	No gap between S1-S2
20	Ulna	Complete	L	100	1	1	A	-	-
20	Radius	Complete	R	100	1	1	A	-	
20	Skull	Occipital, missing right lateral part	-	70	5	1	A	-	
20	Tibia	Mid-shaft	R	40	3	1	A	-	
20	Radius	Proximal and mid-shaft, and proximal metaphysis	L	50	2	1	ADO	-	Unfused proximal articulation
20	Vertebra	Lumbar body	-	50	2	1	A	-	DJC= osteophytes grade 2 on superior body
20	Skull	Mandible	R	50	5	1	A	M?	6 tooth positions, 5 teeth present, 1 tooth lost AM, flecks of calculus on all 5 teeth, slight wear.
20	Rib	Head and neck only, middle order	R	10	2	1	A	-	
20	Rib	Sternal end only	-	10	2	1	A	-	
20	Metacarpal	Shaft fragments only	-	20	3	2	A	-	
20	Os coxa	Pubic symphyses matching pair	-	20	2	2	MA	F?-	Phase 5-6
20	Scapula	Origin of acromion	R	10	5	1	A	-	-
20	Humerus	Distal and mid-shaft only	R	60	5	2	A	-	-
21	Tibia	Proximal ¼ of shaft and medial surface of proximal articulation	L	20	2	4	A	-	-
21	Fibula	Proximal ¼ of shaft	R	20	2	3	A	-	
21	Skull	Frontal, anterior left half	L	30	2	1	A	M?	Cribra, grade =2 area=3
21	Rib	Missing sternal end only	R	80	2	1	A	-	
21	Rib	Missing sternal half	L	50	2	1	A	-	
21	Ulna	Proximal articulation and ½ of shaft	L	50	2	1	A	-	-
21	Ulna	Proximal articulation and 1/3 of shaft	R	30	2	1	A	-	

21	Ulna	Missing distal articulation	R	90	3	1	A	-	
21	Os-coxa	Medial half of ilium, including auricular surface	R	20	1	1	MA	-	Auricular surface= irregular and heavily macroporotic
21	Os-coxa	Lateral 1/3 of ilium, including some acetabulum	L	10	2	1	A	-	-
22	Skull	Occipital, frontal, parietals, temporals, and occipital	-	70	4	13	A	-	
22	Skull	Frontal, left parietal and temporal, anterior half of right parietal	-	50	4	4	A	F	
22	Skull	Frontal (missing orbits) medial portions of both parietals and occipital	-	40	4	2	A	-	-
22	Skull	Temporal squamous part	-	30	2	1	A	-	
22	Skull	Parietal vault fragments	-	5	3	18	A	-	
22	Skull	Temporal, missing superior half of squamous part	R	80	2	1	A	M	-
22	Skull	Mandible and maxilla	-	80	1	4	A	M?	28 tooth positions, 27 teeth (1 loose), slight wear, 2 mandibular 3rd molars NP, DEH on 6/27 teeth, flecks to slight calculus on 15/27 teeth, 1 small caries on 1/27 teeth.
22	Skull	Temporal, TMJ only	R	10	2	1	A	-	
22	Skull	Temporal, TMJ only	R	10	4	1	A	-	
22	Skull	Temporal, TMJ only	L	10	4	1	A	-	
22	Skull	Sphenoid greater wing	R	10	1	1	A	-	
22	Tarsal	Talus	R	100	1	1	A	-	Os-trigonum
22	Tarsal	Calcaneus	R	100	1	1	A	-	-
22	Metatarsal	MT1	R	100	1	1	A	-	-
22	Metatarsal	MT2	R	100	1	1	A	-	-
22	Metatarsal	MT3	R	100	1	1	A	-	Porotic inferior half of proximal articulation
22	Metatarsal	MT4	R	100	1	1	A	-	-
22	Metatarsal	MT5	R	100	1	1	A	-	-
22	Tarsal	Talus	L	100	2	1	A	-	-
22	Tarsal	Calcaneus	L	100	2	1	A	-	-
22	Tarsal	Navicular	R	100	2	1	A	-	-

22	Tarsal	Lateral cuneiform	R	100	2	1	A	-	Porotic inferior half of metatarsal articulation
22	Metatarsal	MT1, dorsal surface abraded	R	80	3	1	A	-	
22	Metatarsal	MT4	R	100	3	1	A	-	
22	Metatarsal	MT5, missing distal articulation	R	90	3	1	A	-	
22	Femur	Distal articulation and distal and mid shaft	L	60	2	4	A	-	Osteitic bone along entire shaft. Remodelled lamellar like. Woven bone on posterior surface of distal shaft. No cortex as such, been replaced by low quality porotic bone, although the medullary cavity not occluded. Possible cloaca on lateral surface of lateral condyle, smooth medial edge and sharp lateral edge, but occluded by mud, poss osteomyelitis.
22	Scapula	Glenoid and lateral margin of blade	R	25	4	1	A	-	
22	Scapula	Origin of acromion	R	15	4	1	A	-	-
22	Vertebra	Thoracic T12, missing lateral ½ of body	-	80	2	1	A	-	
22	Vertebra	Thoracic T11, missing lateral ½ of body	-	80	2	1	A	-	Schmorl's node on inferior body
22	Vertebra	Thoracic T10? missing lateral ½ of body	-	70	2	1	A	-	
22	Vertebra	Thoracic T9? missing lateral ½ of body and arch (missing left facets)	R	40	2	1	A	-	-
22	Vertebra	Thoracic, inferior arches only	-	20	3	1	A	-	-
22	Radius	Missing tubercle	L	90	1	2	A	-	-
22	Ulna	Mid-shaft	R	30	1	1	A	-	
22	Fibula	Distal and mid-shaft	L	60	1	1	A	-	
22	Ribs	X4 middle order rib heads and necks	R	20	1	4	ADO-YA	-	Transverse articulations fused, heads fusing
22	Ribs	X4 middle order and lower rib heads and necks	L	20	1	3	ADO-YA	-	Transverse articulations fused, heads fusing
22	Ribs	Rib shaft fragments	-	20	3	18	-	-	-
22	Os-coxa	Ilium, missing lateral half of squamous part	L	80	1	1	OJ-ADO	-	Acetabulum and iliac crest unfused

22	Os-coxa	Ilium, missing superior squamous part	R	50	1	1	OJ-AD O	-	Acetabulum unfused
22	Clavicle	Lateral and medial shaft	R	50	5	1	A	-	
22	Clavicle	Lateral shaft	R	30	5	1	A	-	
22	Humerus	Complete	R	100	3	1	A	-	Muscle excavation, pectoralis major-OD on radial articulation= 7mm in diameter
22	Femur	Missing distal and proximal epiphyses	R	80	3	2	AD O	-	Unfused ends and trochanters, max length= 421mm
22	Tibia	Complete	L	100	4	1	A	-	Medial squatting facet
22	Fibula	Missing epiphyses	L	80	3	2	AD O-A	_	-
22	Tibia	Missing epiphyses	R	80	5	1	YJ-OJ	-	Unfused ends, max length=237mm
22	Femur	Missing epiphyses	L	80	3	1	YJ	-	Unfused ends, max length=209mm
22	Humerus	Mid and distal shaft, missing distal epiphyses	L	60	4	1	YJ	-	-
23	Rib	Shaft fragments	-	10	2	12	A	-	
23	Rib	Upper order necks and heads x 8	R	30	2	8	A	-	
23	Rib	Lower order necks and heads x 5	R	30	2	5	A	-	
23	Rib	Lower order necks and heads x 2	L	20	3	2	A	-	
23	Rib	Middle order, complete	L	100	1	1	YJ	-	-
23	Metatarsal	MT1	R	100	2	1	A	-	
23	Metatarsal	MT2	R	100	2	1	A	-	
23	Metatarsal	MT3	R	100	2	1	A	-	
23	Metatarsal	Distal articulation of MT1	L	30	2	1	A	-	
23	Metacarpal	MC2	R	100	2	1	A	-	
23	Phalanx	X2 proximal manual phalanges	-	100	2	2	A	-	
23	Sternum	Distal half	-	50	3	2	A	-	
23	Os-Coxa	Ischium	R	60	1	1	A	-	
23	Os-coxa	Ischium	L	60	1	1	A	-	
23	Vertebra	Thoracic (upper) arch only X3	-	40	2	3	A	-	

23	Vertebra	Thoracic (upper) right side of arch only X3	R	20	2	2	A	-	
23	Vertebra	C2 X2, both missing inferior body	-	80	3	2	A	-	
23	Vertebra	C1	-	100	1	1	A	-	Posterior atlas bridging (L)
23	Vertebra	C3/4	-	100	3	1	A	-	
23	Vertebra	Thoracic T1	-	100	2	1	A	-	
23	Vertebra	Mid thoracic	-	100	2	1	A	-	Schmorl's node on inferior body G1
23	Femur	Shaft fragments	-	5	4	2	A	-	-
23	Skull	Mandible complete	-	100	1	2	A	F??	13 tooth positions, 6 teeth, 4/13 lost PM, 3/14 lost AM, slight to medium calculus on 6 teeth, 2 caries on 2'6 teeth (buccal), abscess internal ay root of L M3, moderate periodontal disease
23	Maxilla	Posterior half of R side	R	25	1	1	A	-	6 tooth positions, 3 teeth, 3/6 lost PM, Moderate calculus on 3/3 teeth, moderate periodontal disease
23	Skull	Frontal, parietals and occipital	-	60	5	13	A	-	-
23	Clavicle	Shaft only	R	80	3	1	A	-	-
23	Clavicle	Missing medial end	L	90	3	1	A	-	-
23	Clavicle	Missing lateral end	L	90	1	1	A	1	-
23	Ulna	Proximal shaft and articulation	R	30	1	1	A	-	-
23	Patella	Complete	L	100	2	1	A	-	
23	Radius	complete	R	100	5+	2	A	-	Max length= 260mm
23	Radius	Missing distal articulation	L	90	5	1	A	-	
23	Humerus	Complete	R	100	3	1	A	-	Max length= 357mm
23	Humerus	Complete	L	100	5+	1	A	-	Max length= 260mm
23	Humerus	Proximal articulation	R	10	2	1	A	-	
23	Femur	Missing segment of mid-shaft	R	90	2	2	A	-	AP=30.5mm, ML=40.7mm
23	Femur	Distal articulation and distal 1/3 of shaft	L	30	0	1	A	-	
23	Scapula	Missing some of blade	R	80	2	3	A	-	
23	Scapula	Inferior tip of blade	L	10	1	1	A	0	
23	Femur	Proximal articulation only	-	5	1	1	A	-	
24	Femur	Complete	R	100	1	2	A	-	MAX length= 435mmAP=26.4mm ML=31.4mm,

									NMT third trochanter
24	Femur	Proximal 1/3 of shaft, missing articulation	L	30	2	1	A	-	Lamellar bone across entire shaft. Ap= 25.3mm ML= 41.3mm
24	Femur	Complete	L	100	3	2	A	-	MAX length= 445mmAP=23.9mm ML=31.9mm,
24	Femur	Distal articulation only	L	10	1	1	A	-	
24	Femur	Distal articulation only	L	10	1	1	A	-	
24	Femur	Distal half of shaft and distal articulation	R	50	3	1	A	-	-
24	Femur	Proximal and mid-shaft only	R	40	3	1	A	-	
24	Femur	Complete except for fragments of mid-shaft	R	90	1	6	A	-	AP=25.6mm ML=33.4mm
24	Femur	Proximal ¼ of shaft only	R	20	4	1	OJ-ADO	-	Greater and lesser trochanters unfused
24	Femur	Proximal articulation only	R	10	2	1	A	-	
24	Femur	Shaft fragments	-	10	2	5	A	-	
24	Tibia	Shaft only	R	70	5+	1	J	-	
24	Tibia	Shaft only	L	70	5+	1	J	-	
24	Tibia	Proximal articulation and proximal ½ of shaft	R	50	1	1	A	-	AP=34.0mm ML=26.4mm
24	Tibia	Proximal articulation and proximal 1/3 of shaft	R	40	2	1	A	-	AP=37.70mm ML=26.2mm
24	Tibia	Proximal articulation and proximal ½ of shaft	L	50	4	1	A	-	-
24	Tibia	Proximal articulation and proximal and mid shaft	R	60	1	1	A	-	AP=40.9mm ML=30.0mm
24	Tibia	Medial 1.3 of shaft only	L	25	5	1	A	-	
24	Tibia	Distal articulation only	L	10	2	1	A	-	Woven bone covers posterior surface and medial malleolus
24	Tibia	X2 Mid shafts	R	30	2	2	A	-	
24	Tibia	Shaft fragments	-	10	2	5	A	-	
24	Tibia	Proximal, medial articulation	R	5	1	1	A	-	
24	Fibula	complete	R	100	2	4	A	-	
24	Fibula	Mid-shaft fragments	-	20	2	5	A	-	
24	Calcaneus	Complete	L	100	3	1	A	-	
24	Humerus	Complete	L	100	5	2	A	-	Max length=360mm

24	Humerus	Missing lateral surface of distal articulation	R	95	4	2	A	-	-
24	Humerus	Missing proximal articulation	L	90	2	1	A	-	-
24	Humerus	Distal ¼ of shaft and articulation	L	20	2	1	A	-	-
24	Humerus	Mid-shaft fragment	-	10	2	1	A	-	
24	Humerus	Proximal ¼ of shaft	-	10	4	1	A	-	
24	Humerus	Proximal articulation	L	15	1	1	A	-	
24	Humerus	Distal articulation and ¼ of shaft	R	25	1	1	A	-	
24	Humerus	Shaft only	L	80	4	2	A	-	
24	Humerus	Distal 1/3 of shaft only	R	25	1	1	A	-	
24	Humerus	Proximal articulation	R	10	1	1	A	-	
24	Os-coxa	Missing pubis	R	70	1	1	OM A	M	Transverse striae still present, course granularity and islands of densification
24	Os-coxa	Acetabulum only	R	10	3	1	A	-	
24	Os-coxa	Ilium (missing auricular surface) and superior half of ischium	R	60	2	2	A	-	Avulsion of superior/posterior margin of acetabulum
24	Os-coxa	Lateral half of ilium, and superior half of ischium	R	50	3	1	OM A-MA	-	Syndesmophyte on the superior-lateral margin of the auricular surface- possibly the start of sacroiliac fusion
24	Os-coxa	Superior medial and lateral margins of ilium and pubis missing	R	60	4	1	A	-	Inferior half of sacral ala fused to the inferior half of the auricular surface-sacroiliac fusion
24	Os-coxa	Ischium and inferior half of acetabulum	L	10	2	1	A	-	
24	Os-coxa	Lateral half of ilium and acetabulum	L	40	3	1	A	-	
24	Os-coxa	Inferior half of ilium, including auricular surface	L	30	3	1	MA	-	Dense, irregular and macroporotic
24	Os-coxa	Lateral half of auricular surface	R	10	1	1	Mid Ad	-	Inactive
24	Os-coxa	Auricular surface fragment	-	5	1	1	Mid Ad	-	Inactive
24	Os-coxa	Iliac crest fragment	-	5	1	1	A	-	
24	Os-coxa	Ischio-pubic ramus	-	5	1	1	A	-	-
24	Sacrum	Superior half	-	70	3	2	A	-	S1 &2 fused
24	Sacrum	Missing both ala	-	70	2	2	A	-	S1 &2 fused
24	Clavicle	Missing lateral articulation	L	90	2	1	A	-	

24	Clavicle	Missing lateral articulation	R	80	2	1	A	-	
24	Clavicle	Mid-shaft	R	60	4	1	A	-	
24	Clavicle	Medial shaft, missing articulation	R	30	4	1	A	-	
24	Ulna	Proximal articulation, and proximal ¼ of shaft	R	20	1	1	A	-	
24	Ulna	Inferior half of proximal articulation	L	5	1	1	A	-	
24	Ulna	Proximal ¼ of shaft	L	20	1	1	A	-	
24	Ulna	Distal ¼ of shaft and articulation	L	20	1	1	A	-	
24	Radius	Complete	R	100	3	1	A	-	Max length= 274mm
24	Radius	Complete	R	100	2	1	A	-	Max length= 232mm
24	Radius	Distal 1/3 of shaft and articulation	R	30	1	1	A	-	-
24	Radius	Distal 1/3 of shaft and articulation	L	30	3	1	A	-	
24	Radius	Mid-shaft	L	30	3	1	A	-	
24	Radius	Proximal ¼ of shaft and articulation	L	20	2	1	A	-	
24	Radius	Proximal ¼ of shaft and articulation	R	20	2	1	A	-	
24	Vertebra	Thoracic T1 arch only	-	30	1	1	A	-	-
24	Vertebra	Thoracic T2 arch only	-	30	1	1	A	-	-
24	Vertebra	Thoracic, (upper), missing superior facets	-	90	1	1	A	-	
24	Rib	Shaft fragments	-	10	2	5	A	-	
24	Rib	X2 1st ribs	R	80	3	2	A	-	
24	Rib	11^{th} and 12^{th} ribs, complete	R	100	2	2	A	-	
24	Rib	X6 middle order rib head and necks	R	20	2	6	A	-	
24	Rib	Middle order rib neck	L	10	3	1	A	-	
24	Metatarsal	MT2	L	100	2	1	A	-	
24	Metatarsal	MT3 proximal articulation and half of shaft	L	40	1	1	A	-	
24	Metacarpal	MC5	L	100	2	1	A	-	
24	Metacarpal	MC5	L	100	3	1	A	-	
24	Metacarpal	MC3	R	100	3	1	A	-	
24	Metacarpal	Shaft only MC5	L	80	3	1	A	-	
24	Skull	Mandible	-	100	3	2	A	M?	16 tooth positions, 5 teeth, 11 teeth lost PM, heavy wear, externally draining abscess

									mandible root of M2, slight calculus on 2/5 teeth, slight periodontal disease.
24	Skull	Occipital, Parietals and posterior half of frontal	-	50	4	8	A	-	-
24	Skull	Sphenoid greater wing	R	30	2	1	J	-	-
24	Scapula	Glenoid	L	20	2	1	A	-	
24	Scapula	Lateral border and inferior half of glenoid	L	30	2	1	J	-	
24	Scapula/humerus	Glenoid, coranoid and humeral head (FUSED)	L	20	3	1	A	-	Capsular ligament fusion all the way round, with evidence of rotator cuff trauma (spiculated bone), potential humeral head fracture and posterior displacement, fusion to stabilise
25	Tibia	Complete	L	100	1	2	A	-	AP= 37.6mm, ML=27.4mm. Max length=407mm
25	Tibia	Missing proximal articulation	L	80	2	1	A	-	-
25	Tibia	Proximal 2/3 of shaft and proximal articulation	R	70	2	1	A	-	-
25	Femur	Distal 2/3 of shaft and distal articulation	L	50	4	1	A	-	
25	Femur	Shaft fragment	-	5	3	1	A	-	
25	Femur	complete	L	100	3	1	A	-	AP= 27.1mm, ML=39.0mm. Max length=478mm
25	Femur	Shaft and femoral neck	L	70	5+c	2	A	-	-
25	Femur	Proximal articulation and trochanters	R	25	1	1	A	-	AP= 33.8mm, ML=36.2mm
25	Femur	Proximal ½ of shaft only	R	40	1	1	A	-	
25	Femur	Distal ½ of shaft, and distal articulation	R	50	2	1	A	-	
25	Femur	Distal ½ of shaft, and distal articulation	R	50	1	1	A	-	
25	Femur	Shaft only	R	70	2	1	A	-	-
25	Femur	Proximal ½ of shaft only, including greater trochanter	R	40	3	2	A	-	-
25	Sacrum	Inferior half	-	40	1	1	A	-	-
25	Sacrum	Half of neural arch of S1	L	5	2	1	A	-	-
25	Sacrum	Half of neural arch of S1	R	5	2	1	A	-	-
25	Rib	Shaft fragments	-	20	2	15	A	-	
25	Rib	X2 first rib shafts (missing necks)	L	80	3	2	A	-	
25	Rib	X2 second ribs	L	80	2	2	A	-	
25	Rib	X 5 lower order rib necks	L	20	2	5	A	-	

25	Rib	X3 first ribs	R	100	1	3	A	-	
25	Rib	X 4 upper order ribs, missing sternal ends	R	80	3	4	A	-	
25	Rib	X 5 middle order ribs, missing sternal ends	R	70	2	5	A	-	
25	Rib	X 3 lower order ribs	R	90	2	3	A	-	
25	Vertebra	Lumbar anterior part of body	-	30	3	1	A	-	DJC= Grade 3 osteophytes on the superior body. Schmorl's node on the inferior body
25	Vertebra	Cervical C1	L	50	2	1	A	-	NMT= double superior facet
25	Vertebra	Cervical arch, missing left facets	R	30	2	1	A	-	-
25	Vertebra	Thoracic, X5 middle order arches	-	40	2	5	A	-	-
25	Vertebra	Thoracic, X2 upper order arches	-	40	3	2	A	-	-
25	Vertebra	Middle order thoracic vertebra, missing the superior L facet	-	90	2	1	A	-	DJC= Grade 1 osteophytes on the superior body.
25	Ulna	Missing the distal articulation	L	90	1	3	A	-	-
25	Ulna	Proximal articulation and the proximal ½ of shaft	L	50	3	1	A	-	-
25	Ulna	Proximal articulation and the proximal 2/3 of shaft	R	70	3	1	A	-	-
25	Ulna	Proximal articulation and the proximal 1/3 of shaft	R	30	3	1	A	-	
25	Ulna	Complete	R	100	3	2	A	-	
25	Radius	Complete	L	100	2	2	A	-	
25	Radius	Complete	L	100	3	2	A	-	
25	Radius	Complete	L	100	3	1	A	-	
25	Radius	Shaft only	L	70	5	1	A	-	
25	Radius	Missing epiphyses	L	90	4	1	OJ	-	Max length= 162mm = 7-8 yrs
25	Radius	Shaft only	L	80	4	1	YJ	-	Age based on comparison with above
25	Humerus	Proximal articulation only	L	10	1	1	A	-	
25	Humerus	Proximal articulation only	L	10	1	1	A	-	
25	Humerus	Distal half of shaft and distal articulation	L	60	2	1	A	-	
25	Humerus	Distal half of shaft missing distal articulation	L	40	4	1	A	-	
25	Humerus	Proximal half of shaft missing proximal articulation	L	40	1	1	A	-	

25	Humerus	Distal 1/3 of shaft and distal articulation	R	30	3	1	A	-	
25	Humerus	Distal articulation	R	10	1	1	A	-	
25	Humerus	Proximal half of shaft missing proximal articulation	R	40	2	1	A	-	
25	Humerus	Proximal half of shaft missing proximal articulation	R	40	3	1	A	-	
25	Humerus	Distal 1/3 of shaft only	R	30	5+	1	J	-	
25	Humerus	Proximal ¼ of shaft	R	20	2	1	A	-	
25	Metacarpal	Complete	R	100	3	1	A	-	
25	Metacarpal	Missing the distal articulation	L	90	1	1	A	-	
25	Os-coxa	Ilium, sciatic notch, and auricular surface	L	20	2	2	MA	F?	Densification, no transverse organisation slight retro auricular activity
25	Os-coxa	Missing ischium, and superior part of iliac crest	L	70	4	1	MA	F	
25	Os-coxa	Pubic symphysis only	L	10	4	1	MA	M?	Symphysial rim complete
25	Os-coxa	Missing lateral part of iliac crest and os pubis	L	60	2	2	MA	?	Dense, no striae, macro porosity
25	Os-coxa	Portion of ilium and ischium-sciatic notch and posterior part of acetabulum	R	30	4	1	A	F	
25	Os-coxa	Ischium and pubis and inferior part of ilium	R	60	2	1	MA	M	
25	Os-coxa	Missing pubis	R	70	3	1	MA	M?	Acetabulum DJC= Grade 2cysts -irregular, dense auricular surface
25	Os-coxa	Iliac rest fragment	L	5	1	1	A	-	
25	Os-coxa	Acetabulum fragment	-	5	2	1	A	-	
25	Os-coxa	Os-pubis (unfused, complete)	R	100	2	1	A	J	Un fused
25	Os-coxa	Acetabulum, and ischium	R	20	3	1	A	-	-
25	Clavicle	Shaft only	R	80	3	1	A	-	
25	Clavicle	Shaft only	L	80	3	1	A	-	
25	Clavicle	Shaft only	R	80	4	1	A	-	
25	Clavicle	Shaft only	R	60	5	1	A	-	Healed oblique fracture on lateral half of shaft, with slight superior and anterior displacement of lateral fragment.
25	Skull	L frontal and left parietal	L	30	3	5	A	M	
25	Skull	Frontal. L squamous part, missing orbit	L	40	3	1	J	-	-

25	Skull	Frontal, anterior half	-	50	2	1	A	M	Cribra grade 2 area 4
25	Skull	Frontal, missing R orbit and R lateral margin	-	80	4	1	A	F	Cribra grade 2 area 2
25	Skull	Frontal, missing L orbit	-	90	2	2	A	-	-
25	Skull	Frontal R half and parietal	R	20	2	3	A	M?	-
25	Skull	Occipital and posterior half of R parietal	-	20	2	2	A	M	-
25	Skull	Temporal, missing squamous part and greater wing of sphenoid	R	20	2	2	A	M	-
25	Skull	X 4 parietal vault fragments	-	5	2	4	A	-	-
25	Skull	Occipital, around un-fused sutra mendosa	-	10	1	1	I	-	-
25	Skull	Mandible, R side only	R	50	3	1	A	M	7 tooth positions, 7 teeth present, 7/7 teeth with flecks of calculus, moderate wear
25	Skull	Mandible, R side only	R	40	2	1	A	M	5 tooth positions, 5 teeth, 5/5 teeth with flecks of calculus, slight wear
25	Skull	R maxilla and zygoma	R	20	2	1	A	-	Probably associated with 5 teeth in mandible above. 6 tooth positions, 6 teeth, slight wear, flecks of calculus on 3/6 teeth
25	Skull	Posterior half of maxilla	R	5	2	1	A	-	5 tooth positions, 5 teeth, slight calculus on 5/5 teeth, moderate wear, slight periodontal disease
25	Skull	Posterior half of maxilla	L	5	2	1	A	-	3 tooth positions, 3 teeth, slight calculus on 3/3 teeth, moderate wear, slight periodontal disease
25	Scapula	Acromion, lateral border and glenoid	R	60	2	3	A	-	-
25	Scapula	Acromion, lateral border and glenoid	R	50	2	1	A	-	
25	Scapula	lateral border and glenoid	R	30	3	1	A	-	
25	Scapula	Acromion, lateral border and glenoid	R	50	2	1	A	-	
25	Scapula	Acromion	L	5	2	1	A	-	
25	Scapula	Medial border of blade	-	5	2	2	A	-	
26	Tibia	Distal articulation only	L	10	2	2	A	-	-
26	Tibia	Complete	R	100	1	1	ADO-YA?	-	Max length= 330mm. AP= 27.7mm ML= 21.2mm. Epiphyseal line still visible around superior margin
26	Femur	Distal articulation, and distal 1/3 of shaft	L	30	3	1	A	-	-

26	Humerus	Proximal articulation and proximal ¼ of shaft	L	20	3	1	A	-	-
26	Humerus	¼ of proximal shaft	L	5	2	1	A	-	
26	Femur	proximal ¼ of shaft	R	20	3	1	YJ	-	Unfused head and trochanters
26	Rib	Shaft fragment	-	5	2	1	A	-	-
26	Fibula	Proximal articulation and proximal ¼ of shaft	R	20	2	1	A	-	-
26	Fibula	Shaft fragment	-	10	3	1	A	-	-
26	Skull	Mandible	L	40	2	1	A	M	5 tooth positions 2 teeth present, 3 TP lost PM. flecks of calculus on 2/2 teeth, moderate wear, slight periodontal disease
26	Skull	R side of occipital and posterior half of parietal	R	20	3	-	A	-	
26	Skull	Frontal, both zygomas and maxillae, both parietals and L temporal	-	70	2	6	OJ	-	12 tooth positions, 7 teeth present, 5 teeth lost PM, DEH on 4/7 teeth, large abscess on the R maxilla internally draining at root of lateral and central incisor and canine. Max PM2 root 7/8 complete, < 12 yrs. Cribra R orbit Grade 2 area 5.

APPENDIX 2

MEDIEVAL AND LATER POTTERY BY C.G CUMBERPATCH

C.G. Cumberpatch BA PhD
Freelance Archaeologist

Introduction

The pottery assemblage from the Old Joiners Workshop, Askham Richard, York (OJC17) was examined by the author on 2nd and 5th December 2017. It consisted of fifty-three sherds of pottery weighing 754 grams representing a maximum of fifty-two vessels. The data are summarised in Table 1. The pottery was accompanied by three sherds of ceramic building material (CBM) from two contexts. These are listed in Table 2.

The pottery

The earliest pottery in the assemblage was of medieval date and consisted of Yorkshire Gritty ware showing the range of variation in fabric and form typical of this type of pottery. It is known in York simply as Gritty ware (Mainman and Jenner 2013: 1178-1184) but the term Yorkshire Gritty ware is used here following the work of Vince and Young (nd). The sherds included a number of rims with the characteristic heavy, sub-angular profile on thin walled bodies, often rilled. An example from context 30 had a lid-seated form. The fabrics were all tempered with sub-rounded to sub-angular quartz and varying quantities of other inclusions including hard red iron-rich grit and white to pale grey mudstone. The significance of the variation, also identified by Vince and Young at Wetherby and by the author on numerous sites across northern Yorkshire, is at present unclear but may relate to changes in clay procurement over time or to variations in clay sources between potteries. Many of the sherds bore traces of sooting and/or burnt food residues on the exterior surfaces, consistent with the use of these vessels as cooking pots (CP). One small group of sherds from contexts 24 and 30 was distinguished not only by the slightly different character of the fabric but also by the presence of patchy green glaze on the internal and external surfaces. They were given the name Glazed Gritty wares to distinguish them from the commoner Yorkshire Gritty wares. The date range of all of these vessels spans the mid 11th to mid/late 13th century. A sherd of Buff Sandy ware from context 2 was probably contemporary with the coarser wares.

Slightly later in date were the sherds of York Glazed ware from contexts 2, 24 and 30. All of these were body sherds and bore the characteristic dark green glaze. Two examples were decorated (contexts 2 and 24). Broadly contemporary Beverley type wares were present in context 2 with one sherd of Beverley 1 ware from context 23.

Brandsby type ware, characteristic of the period between 1250 and 1350, was well represented in the assemblage with sherds present in contexts 2, 24 and 25 although all were body sherds and none could be definitely linked with specific vessel forms. A sherd in an unidentified reduced sandy fabric from context 2 may be broadly contemporary with the Brandsby type wares.

Later medieval wares included a sherd of Walmgate type ware from context 1 and a small group of unidentified oxidised sandy sherds from context 24.

Post-medieval wares (c.1450 – c.1720) were notable by their scarcity with a small sherd of Redware type from context 24 the only one of this date range identified. Early modern wares (c.1720 – c.1840) were represented by sherds of Late Blackware from contexts 23 and 30 but the remainder of the assemblage, consisting of sherds from contexts 1, 2 and 30 was of recent date. Given its small size, this was a diverse group which included the profile of a jar, probably a retail vessel from context 1 and parts of two transfer printed (TP) plates from context 30, both bearing the popular Asiatic Pheasants design. Other sherds included a small piece of porcelain and part of a carinated bowl in a slip-banded Cane Coloured (CC) fabric. All of these sherds are typical components of mid to late 19th century

pottery assemblages.

Discussion

The small size of the assemblage precludes any detailed or far-reaching interpretation but some points may be noted.

All of the contexts except for 25 (which produced just two sherds) show evidence of residuality in the form of mixed medieval assemblages and the presence of small quantities of later wares alongside larger quantities of medieval pottery. In the cases of contexts 23 and 24 the later material was of post-medieval and early modern date but elsewhere it was of recent date. The condition of the medieval pottery was good, suggesting that while disturbance had occurred, it had not been intense or sustained and had not led to significant abrasion of the earlier material. The implication is that the site was first occupied in the earlier post-Conquest period and saw a higher level of activity throughout the medieval period than subsequently with the result that the quantities of later material were significantly lower than those of medieval date. There was no indication from the pottery that the activity on the site was anything other than domestic in nature. The range of wares and types represented seem to be entirely typical of a site within the environs of York.

Archiving and curation

On the completion of the project the pottery assemblage should be deposited in the appropriate local museum or finds depository where it will be available for further research in the future.

Bibliography

Mainman, A and Jenner, A 2013 **Medieval pottery from York** The Archaeology of York The Pottery 16/9 York Archaeological Trust / Council for British Archaeology

Young, J and Vince (with P. Didsbury) nd **A report on the post-Roman pottery from Castle Gate, Wetherby, West Yorkshire** Unpublished archive report

Table 1	Ceramics Data								
Context	**Type**	**No**	**Wt**	**ENV**	**Part**	**Form**	**Decoration**	**Date range**	**Notes**
1	Walmgate type ware	1	12	1	BS	Hollow ware	White slip ext	MC14th – C15th	Hard oxidised to reduced sandy fabric w/ common quartz up to 0.5m, mainly finer
1	Whiteware	1	69	1	Profile	Jar	U/Dec	MC19th – EC20th	Cylindrical jar w/ shoulder & short neck
2	Beverley type ware	1	4	1	Base	Hollow ware	U/Dec	MC12th – MC14th	Fine dark orange fabric
2	Beverley type ware	1	2	1	BS	Hollow ware	U/Dec	MC12th – MC14th	Fine dark orange fabric w/ sparse red grit; coarser fabric
2	Brandsby type ware	1	15	1	BS	Hollow ware	Streak of green glaze ext	E/MC13th – C14th	
2	Buff Sandy ware	1	2	1	BS	Hollow ware	U/Dec	MC11th – M/LC13th	Buff sandy fabric w/ moderate quartz up to 0.5mm
2	Colour Glazed ware	1	2	1	BS	Hollow ware	Rilled ext w/ green glaze int & ext	LC18th – EC19th	Probably a colour glazed Creamware
2	Yorkshire Gritty ware	1	8	1	Base	Jar/CP	Dry smoothed ext	MC11th – M/LC13th	Hard dense buff to grey fabric w/ moderate quartz up to 1mm
2	Porcelain	1	2	1	BS	Hollow ware	U/Dec	MC19th – EC20th	
2	Reduced Sandy ware	1	15	1	BS	Hollow ware	Dark green mottled glaze ext; patchy white slip int	C13th – C14th?	Fine dark grey fabric w/ moderate fine quartz up to 0.5mm, mainly finer
2	Slip Banded CC ware	1	5	1	BS	Carinated bowl	Thin blue slip line ext above carination	C19th	
2	York Glazed ware	1	3	1	BS	Hollow ware	Mottled dark green glaze ext	M/LC12th – M/LC13th	Moderate fine quartz w/ sparse large white rock frags in a pale to dark grey reduced body; fresh break
2	York Glazed ware	1	4	1	BS	Hollow ware	Mottled green glaze ext w/ part of a metallic stripe ext	M/LC12th – M/LC13th	Dark grey core w/ light grey ext margin w/ common quartz up to 0.5mm
2	Yorkshire Gritty ware	1	32	1	Rim	Jar/CP	U/Dec	MC11th – M/LC13th	Square-sectioned rim w/ rounded

Table 1	Ceramics Data								
Context	**Type**	**No**	**Wt**	**ENV**	**Part**	**Form**	**Decoration**	**Date range**	**Notes**
									corners on a short neck; moderate quartz up to 1mm, sparse mudstone & red grit
2	Yorkshire Gritty ware	1	62	1	Rim	Jar/CP	Rilled body	MC11th – M/LC13th	Flat-topped square-sectioned rim w/ raised ridge on int edge; hard, dense buff to grey fabric w/ moderate quartz up to 1mm
2	Yorkshire Gritty ware	2	27	2	BS	Jar/CP	Rilled body; dry smoothed ext	MC11th – M/LC13th	Hard buff fabric w/ moderate quartz up to 1mm
2	Yorkshire Gritty ware	2	8	2	BS	Jar/CP	Rilled body	MC11th – M/LC13th	Hard dull buff fabric w/ moderate/abundant sub-angular quartz up to 1mm
2	Yorkshire Gritty ware	1	7	1	Base	Jar/CP	U/Dec	MC11th – M/LC13th	Hard dense buff fabric w/ moderate quartz up to 1mm
23	Beverley 1 type ware	1	5	1	BS	Hollow ware	Dark green glaze ext	E/MC12th – EC13th	Fine hard dull red fabric
23	Late Blackware	1	1	1	BS	Hollow ware	Shiny brown glaze int & ext	C18th	Fine red fabric
23	Yorkshire Gritty ware	1	5	1	BS	Jar/CP	Rilled profile	MC11th – M/LC13th	Hard dense buff fabric w/ moderate, well-sorted sub-angular quartz up to 1mm; light sooting ext
23	Yorkshire Gritty ware	1	8	1	Base	Jar/CP	U/Dec	MC11th – M/LC13th	Hard, dense buff to grey fabric w/ common sub-angular quartz up to 1mm
24	Brandsby type ware	1	1	1	BS	Hollow ware	Clear glaze w/ dark pellets	E/MC13th – C14th	Slightly more orange in colour than typical
24	Brandsby type ware	1	9	1	BS	Hollow ware	Small spots of splashed glaze ext	E/MC13th – C14th	Light sooting ext
24	Brandsby type ware	1	3	1	BS	Hollow ware	Thin streak of glaze ext	E/MC13th – C14th	Fine sandy, reduced body w/ pale orange ext margin
24	Brandsby type ware	1	1	1	BS	Hollow ware	Streak of clear glaze ext	E/MC13th – C14th	Pale grey to pale orange variant
24	Glazed Gritty ware	1	12	1	Base	Hollow ware	Patchy clear/green	MC11th – M/LC13th	Hard, dense dull orange to grey

Table 1	Ceramics Data								
Context	**Type**	**No**	**Wt**	**ENV**	**Part**	**Form**	**Decoration**	**Date range**	**Notes**
							glaze int & ext		fabric w/ abundant quartz up to 1mm, occ larger & platey rock frags up to 2mm; cf cxt 30 for similar, non-joining sherds
24	Oxidised Sandy ware	1	7	1	BS	Hollow ware	Small spots of glaze ext	C14th – C15th?	Abundant fine quartz up to to.4mm; Walmgate type?
24	Oxidised Sandy ware	1	7	1	BS	Hollow ware	Rare small spots of glaze ext	C14th – C15th?	Hard, dense orange sandy fabric w/ abundant fine quartz & red grit up to 0.2mm, occ larger
24	Oxidised Sandy ware	1	2	1	BS/Flake	Hollow ware	Ext surface missing	C13th – C14th?	
24	Redware type	1	4	1	BS	Hollow ware	Shiny brown glaze int & ext	C16th – C17th	Bright orange fabric w/ common/abundant fine quartz
24	York Glazed ware	1	2	1	BS	Hollow ware	Dark green glaze ext over a rouletted wedge-design	M/LC12th – M/LC13th	
24	York Glazed ware	1	4	1	BS	Hollow ware	Dark green glaze ext	M/LC12th – M/LC13th	
24	Yorkshire Gritty ware	1	14	1	Rim	Jar/CP	U/Dec	MC11th – M/LC13th	Square-sectioned rim w/ slightly dished top; white to pale orange fabric w/ common, well-sorted quartz up to 1mm
24	Yorkshire Gritty ware	1	18	1	BS	Jar/CP	Rilled profile	MC11th – M/LC13th	Buff fabric w/ fine white streaks; common/abundant sub-angular quartz up to 1mm
24	Yorkshire Gritty ware	1	12	1	Base	Jar/CP	U/Dec	MC11th – M/LC13th	Buff/white fabric w/ common/abundant quartz & sparse red grit & mudstone up to 1mm
24	Yorkshire Gritty ware	1	12	1	Base	Jar/CP	U/Dec	MC11th – M/LC13th	Pale orange fabric w/ moderate quartz up to 1mm; rare large red iron-rich grit up to 4mm
24	Yorkshire Gritty ware	1	4	1	Base	Jar/CP	U/Dec	MC11th – M/LC13th	Buff int & ext margins w/ a grey

Table 1	Ceramics Data								
Context	**Type**	**No**	**Wt**	**ENV**	**Part**	**Form**	**Decoration**	**Date range**	**Notes**
									core; moderate/ abundant sub-angular quartz up to 1mm
24	Yorkshire Gritty ware	1	4	1	BS	Jar/CP	Rilled body	MC11th – M/LC13th	Buff fabric w/ common quartz & sparse red grit & mudstone up to 1mm
24	Yorkshire Gritty ware	1	3	1	BS	Hollow ware	U/Dec	MC11th – M/LC13th	Pale orange fabric w/ moderate/abundant sub-angular quartz up to 1mm
25	Brandsby type ware	1	5	1	BS	Hollow ware	Patchy green glaze ext	E/MC13th – C14th	Slightly greyer than typical
25	Brandsby type ware	1	3	1	BS	Hollow ware	U/Dec	E/MC13th – C14th	Light sooting ext
30	York Glazed type ware	1	18	1	BS	Hollow ware	Sparse patchy dark green glaze ext	M/LC12th – M/LC13th	Pale buff to pale grey fabric w/ sparse/moderate quartz up to 0.5m, mainly finer
30	Glazed Gritty ware	2	36	1	Base	Hollow ware	Patchy clear/green glaze int; knife-trimmed ext	MC11th – M/LC13th	Hard, dense dull orange to grey fabric w/ abundant quartz up to 1mm, occ larger & platey rock frags up to 2mm; cf cxt 24 for similar, non-joining sherds
30	Late Blackware	1	14	1	Base	Hollow ware	Black glaze int only	C18th	Fine orange fabric w/ fine quartz & fine red grit
30	TP Whiteware	1	101	1	Profile	Plate	Asiatic Pheasants	MC19th – EC20th	Crazed & discoloured
30	TP Whiteware	1	97	1	Profile	Plate	Asiatic Pheasants	MC19th – EC20th	
30	Yorkshire Gritty ware	1	40	1	Rim	Jar/CP	Very heavy everted, lid-seated rim on a thin body	MC11th – M/LC13th	Abundant quartz up to 1mm w/ moderate red grit & mudstone up to 4mm & finer in a buff to pale grey body
30	Yorkshire Gritty ware	1	20	1	Rim	Jar/CP	Square-sectioned rim w/ overhanging lip	MC11th – M/LC13th	Light cream/buff fabric w/ moderate, well-sorted quartz up 1mm w/ sparse white mudstone
30	Yorkshire Gritty ware	1	3	1	BS	Hollow ware	U/Dec	MC11th – M/LC13th	Buff-white fabric w/ common/abundant quartz up to 1mm, occ up to 2mm

APPENDIX 3

GLASS FROM BY DR ROSE BROADLEY

January 2018

Eight fragments of post-medieval glass were found during the excavation at Askham Richard: six window glass fragments and two large fragments from bottles. Together they weigh a total of 359g, although the window glass fragments together weigh only 15g, while the bottle fragments weigh 204g and 140g respectively. The bottle fragments are of greater interest as it is possible to date them closely. The first is the larger of the two, and came from the topsoil (context 1), which contained a variety of largely 19th and 20th century material, albeit also a single residual fragment of medieval pottery. The fragment is the base of a utility bottle, and can be dated to c. 1780-1820 by the high and dome-shaped concave base and traces of a disc pontil scar. The lack of evidence for mould seams indicates that the bottle was blown by hand within a few decades of the introduction of the three-part mould in 1821, which marked the start of mass-production of glass utility bottles. The smaller bottle fragment and all of the window glass came from context 30, the rubble and clay deposit filling a large feature stretching across the northern part of the site. The finds in this context are mainly 18th to 20th century in date, although six fragments of residual medieval pottery were also retrieved. This bottle fragment preserves parts of the shoulder, side and base, and dates to c. 1735-1750, earlier than the first bottle fragment. It is from a 'squat cylindrical' bottle, between the 'malet' form and the taller 'cylindrical' form in the rapid evolution of post-medieval utility bottle forms. Both bottle fragments are from olive green utility bottles, so called because although most were originally wine bottles, they were also used for a wide variety of other liquids, mainly alcoholic beverages. Both fragments are heavily laminating.

Context	Colour	Form	Part	No.	Height/ Length	Diameter/ width	Weight	Date range	Notes
1	Olive green	Large utility bottle	Base	1	79	111d	204	c. 1780-1820	Laminating. High domed concave base, traces of disc pontil scar (18th-early 19th c), no evidence of mould seams
30	Olive green	Large utility bottle	Shoulder, side and part of base	1	114	119w (est. diam. 150)	140	c. 1735-1750	Laminating. From 'squat cylindrical' bottle, post 'mallet' [phase and pre-'cylindrical'
30	Pale olive green	Window		4			9	Late post-medieval	Laminating. At least one original edge and putty line mark
30	Pale blue-green	Window		2			6	Late post-medieval	Laminating. At least one original edge and putty line mark

Four of the window glass fragments were pale olive green and two were pale blue-green. All are laminating. These are potash glass fragments, and are difficult to date closely, due to a lack of diagnostic features. A broad late post-medieval date can be allocated, perhaps matching the 18th century date of the bottles.

Archiving and curation

Potential for further research is low and the assemblage is small and late post-medieval, so it is not considered essential to retain it. However, it would be worthwhile to retain the bottle fragment from Context 30 as indicative of the small assemblage from the site.

APPENDIX 4

ASSESSMENT OF SMALL FINDS BY NICKY ROGERS

07/12/17

Introduction and Methodology

Three small finds were provided for assessment, comprising two finds of iron, and one of lead alloy and iron. The iron finds had not been Xrayed, so all the material has been assessed following a visual examination only.

The Finds

Iron

A single iron nail was recovered from Context 20; this deposit comprised articulated human remains, and although no evidence of a coffin appears to have been recorded, it is possible that this could be a coffin nail. Coffin nails have no features which distinguish them from other nails, so in the absence of a coffin, it has to be equally possible that this is a random nail which occurred in the grave fill.

Two adjoining pieces of an iron strap hinge probably used to hang a door were found in Context 26, which has been interpreted as a possible quarry pit of medieval to post medieval date. The hinge appears to be largely complete with an extended rear arm and the possible remains of a hinge pivot within the U-shaped eye.

Context Number	Type	Description	Object	Material	Object Description	Notes
20	Deposit	Articulated human remains	Nail - coffin?	Iron	Appears complete apart from tip of shank, head appears flat circular	
24	Deposit	Fill of large feature[34] = possible quarry pit, similar to contexts 25 and 28,	Plate	Lead Alloy, Iron	Sub-rectangular plate, one edge distorted, with iron nail in each corner along other edge	
26	Deposit	Fill of large feature[32] = possible quarry pit, similar to contexts 25 and 23,	Strap hinge	Iron	In 2 adjoining fragments, comprising tapering strap with rounded end, and extended rear arm, also tapering. Possible remains of hinge pivot within U-shaped eye	Form known from Roman - medieval periods

Lead Alloy

A sub-rectangular plate with two iron nails for attachment was produced by Context 24, a feature similar to Context 26, and thought to be a medieval to post medieval quarry pit. One edge of the plate has been damaged, and the function of the object is unknown.

Conclusions

Unfortunately, none of the objects in this assessment can be said to provide useful information regarding the interpretation of this site, nor do any have features which enable a date to be assigned to them. The strap hinge is of a form known from the Roman through to the post-medieval periods, and neither the nail nor the lead alloy plate are datable.

APPENDIX 5

ANIMAL BONE BY JANE RICHARDSON

In total, 205 animal bone fragments were recovered from hand-excavated features, with the majority associated with deposits that also contained articulated and/or disarticulated human bone. The animal bones may represent up to 1800 years of human activity with late Roman to early medieval deposits, as well as 18th to 20th-century occupation identified. Some elements (in particular the pig bones from the subsoil) may be modern in origin given their large size.

Bones were identified to taxa wherever possible, although lower-order categories (e.g. cattle-size) were also used. As the assemblage was small, all fragments are noted in Table 1, rather than targeting only diagnostic and non-repeatable zones. Overall, the assemblage is small in size, but it is typically in good condition, albeit fragmented. It should be noted that when bone fragments clearly belong to the one element, these were only counted once.

The non-articulated bones include cattle, pig, sheep/goat and chicken. While these may represent food waste, only two butchered bones were actually noted, a cattle humerus from deposit 7 and a cattle metatarsal from deposit 9. The only other modified bones were three gnawed examples from deposits 5, 17 and 19.

One pathological bone was noted, an adult sheep mandible from an early modern linear feature (31). This sheep displayed a congenital absence of the second premolar (Andrews and Noddle 1975, 137). Such congenital defects have been seen to indicate inbreeding within local populations (Cunliffe 1995, 207).

Partial skeletons are also present in the assemblage: dog skeletons from subsoil 2 and deposit 5, pig skeletons from deposits 7 and 15 and a kitten from deposit 19. The dog and pig skeletons from deposits 5, 7 and 15 were associated with disarticulated human bone, while the new-born kitten was found with an articulated human burial.

The dog skeletons represent osteologically mature animals and may indicate the burial of pets or the disposal of unwanted animals. The burial of pig carcasses, in contrast, represent the potential loss of meat from juvenile (from deposit 15) and sub-adult animals (deposit 7). For whatever reason, it seems likely that these particular animals were considered inedible and were buried instead. The kitten is a relatively unusual find, and it's recovery on this occasion is testimony to the attention of the excavators as the bones are very small. Found within the pelvic region of a human inhumation, the possibility that the kitten was deliberately buried with them is acknowledged.

No further analysis of the animal bone assemblage is required, particularly given the broad date range that this material may represent and the likelihood that that the majority of the assemblage is disturbed and/or redeposited (based on the mixing of human and animal bone, and the disarticulated nature of much of the human bone). Nevertheless, it is recommended that it be retained as part of the site archive.

Table 1. Animal bone summary by context

Context	Feature Description	Date	Bone Description	Quantity
2	Subsoil	18-20th C	Cattle metacarpal (numerous fragments)	1
			Cattle pelvis (fused)	1
			Cattle rib fragment	2
			Cattle vertebra (not fused)	1
			Pig ulna (not fused – modern based on size)	1
			Pig metatarsal (not fused – modern based on size)	1
			Pig distal femur (not fused, numerous fragments)	1
			Pig tibia (not fused – modern based on size)	1
			Pig vertebra (not fused)	1
			Dog partial skeleton (all bones fused): proximal humerus, distal humerus (articulated), proximal radius (articulated), proximal ulna (articulated), pelvis, proximal femur, distal femur, proximal tibia	8
			Cattle-size long bone fragment	2
			Sheep-size vertebra fragment	1
4	Deposit	M/P-M	Cattle horncore (numerous fragments)	1
			Cattle scapula fragment	1
			Cattle-size long bone fragment	2
5	Deposit	M/P-M	Cattle mandible fragment	1
			Sheep/goat pelvis (gnawed)	1
			Dog partial skeleton (all bones fused), pelvis (articulated), proximal femur (articulated), distal tibia, calcaneus, distal metatarsal	5
			Cattle-size long bone fragment	2
7	Deposit	M/P-M	Pig mandible fragment	1
			Partial pig skeleton: distal humerus (fused), pelvis (fused, pair), femur (not fused), tibia (not fused)	5
			Cattle humerus barrel (cut marks)	1
			Cattle metacarpal (not fused)	1
8	Deposit	M/P-M	Cattle-size rib fragment	1
			Cattle-sized undiagnostic fragment	1
9	Deposit	M/P-M	Cattle proximal metacarpal	1
			Cattle proximal metatarsal	1
			Cattle proximal metatarsal (dismember cut marks)	1
			Cattle-size rib fragment	1
			Cattle-size long bone fragment	1
10	Deposit	M/P-M	Cattle-sized long bone fragment	1
13	Deposit	M/P-M	Cattle-size rib fragment	1
15	Deposit	M/P-M	Pig skeleton (skull x 3, atlas, scapula x 2, humerus x 1, pelvis x 2, femur x 2, tibia x 1, rib fragments x 42, vertebrae fragments x 67). All not fused	121
			Chicken proximal femur (fused)	1
			Cattle-size long bone fragment	1
16	Deposit	M/P-M	Cattle maxillary premolar	1
			Cattle-sized long bone fragment (eroded)	1
17	Deposit	LR-EM	Cattle proximal femur (fused)	1
			Pig-size long bone fragment (gnawed)	1

Context	Feature Description	Date	Bone Description	Quantity
19	Deposit	LR-EM	Sheep/goat radius shaft (gnawed)	1
			Neonatal cat skeleton: skull fragment x 3, rib x 2, scapula x1, humerus x1, distal humerus x 1, ulna x 1, tibia x 1, proximal tibia x1	11
20	Deposit	LR-EM	Cattle metatarsal shaft fragment	1
22	Deposit	M/P-M	Pig femur shaft fragment	1
23	Quarry pit 32	M/P-M	Cattle maxilla (M3-M1)	1
			Cattle skull fragment	3
			Pig ulna (not fused)	1
			Chicken distal humerus (fused)	1
24	Quarry pit 34	M/P-M	Cattle tibia barrel	1
			Cattle-size rib fragment	2
25	Quarry pit 32	M/P-M	Cattle tibia (not fused)	1
26	Quarry pit 32	M/P-M	Pig fibula fragment	1
			Cattle-size rib fragment	1
30	Linear feature 31	18-20th C	Sheep/goat mandible (M3g, M2g, M1h). Pathology: congenital absence of P2	1
				205

Key: dental wear stages after Grant 1982

Andrews, A. H. and Noddle, B. A., 1975. 'Absence of premolar teeth from ruminant mandibles found at archaeological sites', *Journal of Archaeological Science* 2, 137-144

Cunliffe, B., 1995. *Danebury an Iron Age Hillfort in Hampshire Vol. 6. A Hillfort Community in Perspective* (Council for British Archaeology)

Grant, A., 1982, 'The use of tooth wear as a guide to the age of domestic ungulates', in B. Wilson, C. Grigson and S. Payne (eds), *Ageing and Sexing Animal Bones from Archaeological Sites*, BAR British Series 109, 91-108

APPENDIX 6

OLD JOINERS WORKSHOP (OJC17) CONTEXT DATA

Context number	Feature Number	Fill/Cut/ Deposit	Description	Shape	Profile	Length (m)	Width (m)	Depth (m)	Description
1		Deposit	Top soil/ garden surface	Deposit	Layer	10	8	0.3	Firm 10YR2/2 very dark brown 90%silty sandy clay with 10% small cobles and gravel inclusion
2		Deposit	Sub soil	Deposit	Layer	10	8	0.2	Firm 10YR4/3 brown 95%silty sandy gravel with 5% large and medium cobles inclusion
3		Deposit	Natural	Deposit	Layer	10	8	N/A	Loose 7.5YR6/3 light brown sandy gravel deposit.
4		Deposit	Area of concentration of disarticulated human bones	Amorphous	Irregular	0.95	0.6	0.2	Context number allocated to an area of disarticulated human bones, within context 26. Sporadic oyster shell found
5		Deposit	Area of concentration of disarticulated human bones	Amorphous	N/A	1.2	0.58	0.2	Context number allocated to an area of disarticulated human bones, within context 26.
6		Deposit	Area of concentration of disarticulated human bones	Amorphous	N/A	0.53	0.31	0.2	Context number allocated to an area of disarticulated human bones, within context 23.
7		Deposit	Area of concentration of disarticulated human bones	Amorphous	N/A	1.29	0.81	0.2	Context number allocated to an area of disarticulated human bones, within context 24.
8		Deposit	Area of concentration of disarticulated human bones	Amorphous	N/A	0.38	0.36	0.2	Context number allocated to an area of disarticulated human bones, within context 25.
9		Deposit	Area of concentration of disarticulated human bones	Amorphous	N/A	1.13	0.72	0.2	Context number allocated to an area of disarticulated human bones, within context 24.
10		Deposit	Area of concentration of disarticulated human bones	Amorphous	N/A	1.23	0.8	0.2	Context number allocated to an area of disarticulated human bones, within context 24.
11		Deposit	Area of concentration of disarticulated human bones	Amorphous	N/A	1.5	0.64	0.2	Context number allocated to an area of disarticulated human bones, within context 24.

Context number	Feature Number	Fill/Cut/ Deposit	Description	Shape	Profile	Length (m)	Width (m)	Depth (m)	Description
12		Deposit	Area of concentration of disarticulated human bones	Amorphous	N/A	0.49	0.32	0.2	Context number allocated to an area of disarticulated human bones, within context 25.
13		Deposit	Area of concentration of disarticulated human bones	Amorphous	N/A	0.97	0.94	0.2	Context number allocated to an area of disarticulated human bones, within context 25.
14		Deposit	Area of concentration of disarticulated human bones	Amorphous	N/A	0.67	0.55	0.2	Context number allocated to an area of disarticulated human bones, within context 24.
15		Deposit	Area of concentration of disarticulated human bones	Amorphous	N/A	0.9	0.65	0.2	Context number allocated to an area of disarticulated human bones, within context 28.
16		Deposit	Area of concentration of disarticulated human bones	Amorphous	N/A	0.73	0.72	0.2	Context number allocated to an area of disarticulated human bones, within context 27.
17		Deposit	Articulated human remains	Linear	Flat	2.01	0.4	0.1	Remains of a human skeleton. Orientated on an east to west alignment. No grave cut was identified related to this burial, the skeleton was directly under context (2). It appears that the burial may have cut a former burial.
18		Deposit	Area of concentration of disarticulated human bones	Amorphous	N/A	0.93	0.56	0.2	Context number allocated to an area of disarticulated human bones, within context 2.
19		Deposit	Articulated human remains	Linear	Flat	1.36	0.7	0.1	The upper part of this skeleton (head, torso, arms and hands) was truncated by feature [31]. No grave cut was identified related to this burial; the skeleton was directly under context (2). Burial orientated on a east to west alignment.
20		Deposit	Articulated human remains	Linear	Flat	1.53	0.4	0.1	Remains of a human skeleton. Orientated on a east to west alignment. No grave cut was identified related to this burial; the skeleton was directly under context (2). It appears that the burial may have cut a former burial.
21		Deposit	Area of concentration of disarticulated human	Amorphous		0.62	0.37	0.2	Context number allocated to an area of disarticulated human bones, within context 2.

Context number	Feature Number	Fill/Cut/ Deposit	Description	Shape	Profile	Length (m)	Width (m)	Depth (m)	Description
			bones						
22		Deposit	Area of concentration of disarticulated human bones	Amorphous		1.31	0.62	0.2	Context number allocated to an area of disarticulated human bones, within context 2.
23		Deposit	Fill of large feature [32]	Amorphous	Concave d	2.46	1.44	0.32	Firm 10YR4/3 brown 95%silty sandy gravel with 5% large and medium cobble inclusions. Same as contexts 26 and 24. Sporadic oyster shell fragments found.
24		Deposit	Fill of large feature [34]	Amorphous	Concave d	2.32	1.13	0.5	Firm 10YR4/3 brown 95%silty sandy gravel with 5% large and medium cobble inclusions. Same as contexts 26 and 25. Sporadic oyster shell found
25		Deposit	Fill of large feature [32]	Amorphous	Concave d	2.41	1.16	NA	Firm 10YR4/3 brown 95%silty sandy gravel with 5% large and medium cobbles inclusions. Same as contexts 24 and 26
26		Deposit	Fill of large feature [32]	Amorphous	Concave d	5.22	2.77	0.54	Firm 10YR4/3 brown 95%silty sandy gravel with 5% large and medium cobles inclusion. Same as contexts 25 and 27. Sporadic oyster shell found
27		Deposit	Fill of large feature [34]	Amorphous	C	1.61	1.25	NA	Firm 10YR4/3 brown 95%silty sandy gravel with 5% large and medium cobles inclusion. Same as contexts 26 and 28
28		Deposit	Fill of large feature [34]	Layer		2.64	1.44	0.4	Firm 10YR4/3 brown 95%silty sandy gravel with 5% large and medium cobles inclusion. Same as contexts 26 and 27
29		Deposit	20th century rubble deposit of feature [33]	Layer	Concave d	3.4	1.89	0.45	Loose 10YR6/3Pale brown 60%sand with 10% building material and 30% of mortar inclusion. Associated with the redevelopment of the Old Joinery Shop building
30		Deposit	20th century rubble and clay deposits of feature [31]	Layer	Concave d	8.2	2.64	0.5	Firm 10YR3/2very dark greyish brown 80%silty clay with 10% cobbles and 10% gravel inclusion. Associated with the redevelopment of the Old Joinery Shop building
31		Cut	Large linear feature associated with Joiner Cottage modernisation filled with context 30	Linear	Flat base	8.2	2.64	0.5	Large linear feature which runs along the northeast side of the Old Joiner Shop. Most likely to date to the 18th to 19th century filled with context 30
32		Cut	Medieval /Post medieval large feature interpreted	Irregular	Concave d	5.03	4.94	0.54	Context number allocated to a large feature recorded in plan and partially in section. Not fully excavated.

Context number	Feature Number	Fill/Cut/ Deposit	Description	Shape	Profile	Length (m)	Width (m)	Depth (m)	Description
			as possible quarry pit. Fill by contexts 23, 25 and 26						Identified as a possible Medieval / Post medieval quarry pit.
33		Cut	large feature associated with Joiner Cottage modernisation filled with context 29	Ovate	Concaved	3.4	1.89	0.5	Ovate shape in plan feature with a concaved base. Filled with context 29, and associated with the modernisation of the Old Joinery Shop.
34		Cut	Medieval /Post medieval large feature interpreted as possible quarry pit. Fill by contexts 24, 27 and 28	Irregular	Concaved	3.27	2.63	0.5	Context number allocated to a large feature recorded in plan and partially in section. Not fully excavated. Identified as a possible Medieval / Post medieval quarry pit.
35		Cut	20th century drain and associated manhole	Linear	Flat base	4.51	0.3 to 1.30	NA	20th century drain and associated manhole in phase with the redevelopment of the Old Joinery Shop.