

03 November 2017

## **OSTEOLOGICAL ASSESSMENT OF THE HUMAN SKELETAL ASSEMBLAGE FROM BLOSSOM STREET, YORK by Sophie Newman and Malin Holst**

### **Introduction**

York Osteoarchaeology was provided with 30 skeletons from Blossom Street, York, by the York Archaeological Trust, with the aim of undertaking an osteological assessment to evaluate the accuracy of the original osteological analysis, which had been undertaken in 1990.

The assessment was undertaken in a somewhat more thorough manner to a standard osteological assessment, combining criteria from Mays *et al.* 2002 (for producing osteological assessments), and from Brickley and McKinley 2004 (for producing osteological analysis reports). Every bone was laid out in anatomical order, a skeletal diagram rapidly coloured in, a brief assessment of surface preservation and completeness made, and attempts to determine age and sex of the skeleton alongside a very brief assessment of any obvious surface pathology.

### **Preservation**

Standard assessment of the preservation of skeletons is today based on Brickley and McKinley 2004, and the skeletons were placed into groups of 'good', 'moderate', and 'poor' preservation. While variation between observers is likely to occur, this is comparable with the groupings of the original analysis, which implemented categories of 'good', 'fair', and 'poor' surface preservation.

This assessment found that 40% of skeletons had good preservation (12/30), 50% were moderately preserved (15/30), and only 10% poorly preserved (3/30). While this is somewhat contradictory to the preservation in the original analysis (where more skeletons were found to be moderately to poorly preserved), it must be noted that assessment of surface preservation can be highly subjective on both an inter- and intra-observer level. In both the current assessment and the original analysis it was found that the majority of skeletons were moderately well preserved (Appendix A), having undergone some degree of post-depositional damage within the burial environment.

### **Completeness**

The skeletal completeness ought to be based on colouring in a skeletal diagram and calculating the percentage of skeletal remains that are present and preserved using the diagram. Again, the methods used within the current assessment differed only very slightly from the original analysis, using groupings of '0-25%', '25-50%', '50-75%', and '75-100%' completeness (compared to '<25%', '25-50%', '50-90%', and '>90%'). Despite these minor differences, both the assessment and original analysis revealed similar patterns in completeness, with roughly

half of skeletons more than 50% complete, and just under half of skeletons less than 50% complete. Therefore, the completeness reported in the original analysis is fitting with present day analyses (Appendix A).

### **Sex Estimation**

Only very minor discrepancies were noted between the current assessment and the original analysis in terms of sex estimation, and these differences did not greatly alter the demographic profile originally reported for the site. This amounted to only four skeletons out of twenty adults, and three of these were cases where tentative sex estimations had been assigned, but in the current assessment sexing characteristics were not felt to be sufficiently preserved enough to assign sex to the skeleton. The fourth individual (Skeleton 15) had originally been recorded as a possible female (F?), but in the current assessment was recorded as a possible male (M?) (Appendix A). They were classed as a 'young adult' (18-25 years), and this age range is often problematic for the assessment of sex.

As such, the demographic profile for the current assessment is suggestive of a near equal distribution of males/possible males (26.7%, 8/30) and females/possible females (23.3%, 7.30), with 16.7% of the adult population being unsexed. Within the original analysis there was a very slight preponderance of males (33.3% being males/possible males compared to 26.7% being females/possible females), with a smaller proportion being unsexed (6.7%). However, it is not felt that these slight alterations in demography suggested by the assessment affect the veracity of that suggested by the original analysis, as the current changes may be subjective in nature.

### **Age Estimation**

The current assessment and the original analysis both identified ten non-adults and twenty adults within the assemblage from Blossom Street. Adult age estimation only differed between the current assessment and the original analysis for two individuals. In the first instance, this was due to the original analysis taking a more cautious approach to the age estimation of a poorly preserved skeleton (Skeleton 13), categorising them as an 'adult'. However, it was felt that the presence of an auricular surface (from the pelvis) enabled an estimation of 36-45 years (older middle adult) to be made for this individual (Appendix A). For the second individual the lack of pelvic criteria for the estimation of age led the current assessment to slightly widen the age category in which they had been placed from young adult (18-25 years) to young adult/younger middle adult (18-35 years). Neither of these age changes significantly alters the demographic profile for this population, and simply reflects personal preference and differences in age groupings when undertaking age estimation on fragmented skeletal remains.

Similarly, age estimations made for the non-adults did not differ vastly, with only minor changes in age ranges seen in a small number of individuals that only amounted to a difference of a year at the most, and the use of slightly difference age categorisations.

Overall, the present assessment found that one-third of the skeletal assemblage from Blossom Street were non-adults (less than 17 years of age). One individual was classed as an infant/young juvenile (aged 8 months-18 months), five were young juveniles (aged 1-5 years of age), and four were adolescents (12-17 years of age). While the demographic profile for the non-adults does appear to differ from the original analysis, this is purely due to the use of different age groupings.

Two-thirds of the assemblage were adults. These consisted of one young adult (18-25 years), one young adult/younger middle adult (18-35 years), three younger middle adults (26-35 years), two younger middle adults/older middle adults (26-45 years), four older middle adults (36-45 years), one older middle adult/mature adult (36+ years), five mature adults (46+ years), and three adults for whom age could not be ascertained (18+ years). Once again, the demographic profile only differs from the original analysis due to a difference in age categories used (Appendix A).

### **Stature**

During the assessment, stature was only calculated in very few skeletons due to time constraints and estimation was found to be accurate in all instances (Appendix A). Cranial measurements have also already been taken during the original analysis and were not taken for the assessment.

### **Non-Metric Traits**

Non-metric traits were not assessed, but the report demonstrates that the original analysis undertook the recording of a range of cranial and post-cranial non-metric traits. However, it must be noted that current analyses within YOA encompass a larger range of traits; as such a thorough recording of these traits could bring greater insight into familial distribution in the cemetery.

### **Skeletal and Dental Pathology**

It is clear that the original recording of skeletal pathology was incredibly thorough, and was corroborated by that seen in the current assessment. The majority of pathological discrepancies noted related to the presence of periodontal disease, dental enamel hypoplasia, dental calculus, Schmorl's nodes in the vertebrae and *cribra orbitalia* in the eye orbits, noted in multiple skeletons during the assessment. However, these are mentioned within the original report and therefore were originally recorded, but not included within the catalogue of burials.

Periosteal reactions and endocranial new bone formation do not appear to have been regularly recorded and were noted in a small number of individuals. This may be due to them gaining more importance in the recording process in recent years. Similarly, a distinction between

degenerative joint changes and osteoarthritis has not been made during the original analysis, but enough data regarding the presence of more severe changes such as eburnation can be found in Table 15 of the original report to enable this.

Some notable pathological conditions were identified during the assessment that had previously been missed. This small number of additions is not a reflection on the quality of the previous analysis, as it is inevitable that re-analysis of any site will identify small changes previously overlooked. Some of these cases may also be differential diagnoses for skeletal changes already described in the original analysis (often severe joint disease masking potential traumatic changes).

- Very subtle changes potentially suggestive of metabolic disease (usually in the form of patches of new bone formation or pitting, or residual flaring of the long bones) were seen in the recent assessment in four non-adults (Skeletons 2, 11, 23, and 26).
- Residual rickets (involving the bowing of the femora and tibiae) was noted in an adult (Skeleton 21).
- Thoracic-lumbar border shifts were potentially present in Skeleton 9 and Skeleton 15.
- A benign osteoma was seen on the right temporal bone of Skeleton 19.
- Additional evidence for potential trauma was seen in a small number of adults (often associated with previously recorded injuries or severe joint degeneration) – an ossified haematoma in the left femur of Skeleton 25, *myositis ossificans* on the right tibia and a potential additional fracture on the left fibula of Skeleton 29, a slipped femoral epiphysis on the left femur and possible trauma to the lower lumbar region of the spine of Skeleton 31, and potential compression fractures in the spine of Skeleton 7.

While the recording of skeletal pathology was very thorough in the original analysis, it must be noted that the data can only be used to infer crude prevalence rates for this population. This does limit its comparability with other skeletal assemblages from the Roman period. Systematic recording of spinal pathology and dental pathology is not currently available for this site (although it is possible that this does exist on the original recording forms, which were not available for observation during the assessment). The current inability to form true prevalence rates does limit its comparability with other reports, but does not impede it entirely, as many older reports will also only have crude prevalence rates available for the synthesis of data from this time period.

### **Future Recommendations**

The assessment of the Blossom Street skeletal assemblage has determined that the basic osteological and pathological data contained within the original report are consistent with recording standards currently in practice. Recording standards have continued to evolve over recent years, so it is inevitable that older skeletal reports will not have the necessary data available to enable true prevalence rates to be calculated. While this does limit thorough

comparisons with more recently excavated sites, it does not mean that this cannot be achieved, as enough data is present to enable crude prevalence rates to be formed. Demographic data, such as age and sex estimations, were consistent with those made during the current assessment, and only a small number of additional pathological changes were identified. While age categories used for non-adults and adults did differ, this assessment has enabled each individual to be placed into those used by YOA.

During the assessment, one additional individual was identified (Context [2177]). There was no record for this individual within the existing report, and the presence of cranial fragments from more than one individual suggests that this may be representative of a disarticulated context. However, this should be established and added to the existing data where appropriate. There was also no skeleton present within the assemblage that had been assigned the number 'Skeleton 6'.

Following this assessment it is recommended that the skeletal assemblage from Blossom Street does not require a full re-analysis. However, it would be beneficial to create detailed records of the additional pathological changes outlined above.

As such, there are two possible options:

1. The Blossom Street skeletal assemblage analysis could be left as it stands, with only minor updating required to re-categorise individuals into more frequently used age categories, and to form crude prevalence rates that would enable it to be compared with other Roman populations.
2. Another possible solution might be to allow a university department to curate the assemblage as a teaching collection for some years. This would allow students under careful supervision to analyse certain aspects of the assemblage, such as infectious disease, joint disease, and dental disease to be studied in greater detail, and in accordance with recording standards utilised by YOA. This would permit further study and would allow true prevalence rates and trends to be established. This data could then be later collated into a report alongside any isotopic data that could also be obtained through a student led project. However, it must be acknowledged that there are two drawbacks. Student led analysis would take years and the quality of the data would very much depend on the skills, ability and enthusiasm of the student.

## References

- Brickley, M. and McKinley, J. 2004. *Guidelines to the Standards for Recording Human Remains*, Institute of Field Archaeologists, Technical Paper No 7
- Mays, S., Brickley, M and Dodwell, N. 2002. *Human Bones from Archaeological Sites. Guidelines for Producing Assessment Documents and Analytical Reports*; English Heritage

## Appendix A - Reviewed Skeletal Catalogue

Context	Sk no.	Preservation	Completeness	Sex YOA	Sex Stroud	Age YOA	Age Stroud	Age Category	Stature YOA	Stature Stroud	Dental Pathology YOA	Dental Pathology Stroud	Pathology YOA	Pathology Stroud	Comments
1036	1	Good	50-75%	F	F	46+ yrs	Adult	MA	-	-	Calculus, periodontal disease, DEH, AMTL	Caries, AMTL	Two healed rib fractures; myositis ossificans on dist end of L humerus (supracondyloid process?); Schmorl's nodes; DDD in spine; DJC in thoracic articular facets; DJC L acetabulum; OA R acetabulum and R femur; DJC L medial clavicle	Severe degenerative disease of R hip; healed fractures of two L ribs; supracondyloid process	Mature adult; Periodontal disease, DEH, calculus, degenerative joint changes
1042	2	Good	75-100%	N/A	N/A	8mths-16mths	1-2 yrs	I/YJ	-	-	-	-	Woven bone on L scapula	-	Slightly younger; woven bone on scapula
2035	3	Moderate	1-25%	M	M	46+ yrs	35+ yrs	MA	-	-	AMTL	AMTL	NBF on a cranial fragment likely to be associated with a sinus - sinusitis; fine pitting on supraorbital ridges; DJC L acetabulum; PNBf L femur and L tibia	Partial os inca; OD on L femoral head	Mature adult; PNBf on cranial and post-cranial skeleton
2042	4	Moderate	50-75%	M	M	36-45 yrs	30-40 yrs	OMA	170.41 (femur)	170.18 (femur)	Calculus, periodontal disease, abscess, AMTL	AMTL	Endocranial bone formation; Schmorl's nodes; DDD and DJC in spine; L-S border shift	L-S border shift	Endocranial bone formation; Schmorl's nodes; degeneration in the spine; calculus
2045	5	Moderate	1-25%	U	U	Adult	Adult	Adult	-	-	-	-	Schmorl's nodes	-	Schmorl's nodes
??	6	??	??	??	<u>NO RECORD</u>	??	<u>NO RECORD</u>	??	??	<u>NO RECORD</u>	??	<u>NO RECORD</u>	??	<u>NO RECORD</u>	Can't find a Skeleton 6

### YORK OSTEOARCHAEOLOGY LTD

75 Main Street • Bishop Wilton • York • YO42 1SR • Tel 01759 368483 • Mobile 07803 800806  
E-mail malinholst.yoa@gmail.com • Website : www.yorkosteoarch.co.uk

<b>2062</b>	<b>7</b>	Moderate	75-100%	F	F	46+ yrs	40+ yrs	MA	-	161.46 (humerus)	AMTL (extensive), possible abscess	Caries, AMTL, abscess	Endocranial bone formation; cribra orbitalia; DJC throughout skeleton and spine; DDD in spine; possible compression fractures in spine; spondylolysis; OA in spine; possible healed rib fractures; PNBF on lower limbs; myositis ossificans on R coracoid process	Spondylolysis; coraco- clavicular articulation; degenerative changes to spine; possible osteoporosis; degenerative disease in other joints	OA; endocranial bone formation; PNBF; stature estimation based on reconstructed humerus; cribra orbitalia; compression fractures
<b>2066</b>	<b>8</b>	Good	75-100%	F	F	26-35 yrs	30-40 yrs	YMA	152.17 (femur+tibia)	152.03 (femur+tibia)	AMTL, caries, calculus, abscesses, impacted R upper premolar	Caries, abscesses, impacted 2nd premolar	Cribral orbitalia; PNBF on tibiae; mild DJC in TMJ (bilateral)	DJC R and L wrists; DJC R and L TMJ; osteoma proximal hand phalanx	Slightly younger; PNBF; cribra orbitalia; calculus
<b>2074</b>	<b>9</b>	Moderate	50-75%	F	F	30-40 yrs	30-40 yrs	YMA/OMA	146.89 (femur+tibia)	147.09 (femur+tibia)	-	-	PNBF L femur and tibia; Schmorl's nodes; DDD and DJC in spine; T-L border shift (possible)	-	Spinal pathology; T- L border shift; PNBF
<b>2094</b>	<b>10</b>	Moderate	75-100%	M	M	46+ yrs	40-50 yrs	MA	164.3 (femur+tibia)	164.17 (femur+tibia)	AMTL (extensive), calculus, abscess	AMTL	Ossification of cartilage; DJC throughout skeleton; three healed rib fractures with pseudoarthrosis; ankylosis of sacroiliac joints; PNBF lower limbs; Schmorl's nodes; DDD throughout spine (DISH?); DJC and OA throughout spine	Bilateral calcaneo- navicular bar; degenerative joint disease in spine and several other joints; ankylosis of sacroiliac joints; healed fractures of three L ribs	PNBF; OA
<b>2125</b>	<b>11</b>	Good	25-50%	N/A	N/A	13-15 yrs	12-16 yrs	Ad	-	-	Calculus, abscess (mandible almost looks like it has osteitis), DEH	Abscess	Pitting on greater wing of sphenoid; possible cribra orbitalia	-	Cribral orbitalia; pitting on sphenoid; calculus; DEH

**YORK OSTEOARCHAEOLOGY LTD**

75 Main Street • Bishop Wilton • York • YO42 1SR • Tel 01759 368483 • Mobile 07803 800806  
E-mail malinholst.yoa@gmail.com • Website : www.yorkosteoarch.co.uk

<b>2126</b>	<b>12</b>	Good	25-50%	M	M	30-40 yrs	30-40 yrs	YMA	168.51 (femur)	168.51 (femur)	-	-	PNBF L femur; mild DDD in lumbar vertebrae; ossified costal cartilages	-	PNBF; DDD
<b>2133</b>	<b>13</b>	Moderate	1-25%	U	F?	36-45 yrs	Adult	OMA	-	157.1 (femur)	Calculus	-	Ossification of costal cartilage	-	Differences in sex and age estimation; calculus
<b>2136</b>	<b>14</b>	Good	75-100%	N/A	N/A	2-4 yrs	3-5 yrs	YJ	-	-	Calculus, enamel defects on deciduous canines	-	-	Premature fusion of R lambdoid suture	Calculus; enamel defects (but in report)
<b>2139</b>	<b>15</b>	Good	50-75%	M??	F?	18-25 yrs	20-25 yrs	YA	174.44 (femur+tibia)	172.18 (femur+tibia)	Calculus, supernumerary molars	Bilateral supernumerary molars	Cribral orbitalia; Schmorl's nodes; myositis ossificans L proximal fibula; T-L border shift and possible lumbar rib	Unusually elongated manubrium	Sex estimation discrepancy; cribral orbitalia; Schmorl's nodes; myositis ossificans; border shift
<b>2176</b>	<b>16</b>	Poor	25-50%	U	F?	18-35 yrs	18-25 yrs	YA/YMA	-	-	Calculus	-	Cribral orbitalia; Schmorl's nodes	-	Age and sex estimation; calculus; cribral orbitalia; schmorl's nodes
<b>2177</b>	<b>??</b>	Poor	50-75%	U	NO RECORD	Adult	NO RECORD	Adult	-	NO RECORD	Caries, AMTL, periodontal disease, calculus, abscess	NO RECORD	Sinusitis; slipped femoral epiphysis/fracture on R femur?	NO RECORD	Not recorded originally, more than one individual present?
<b>2200</b>	<b>17</b>	Good	25-50%	N/A	N/A	3-5 yrs	3-5 yrs	YJ	-	-	DEH on unerupted permanent dentition	-	NBF on visceral surfaces of two R upper ribs; endocranial NBF on temporal and occipital bones	New bone formation on visceral surface of two ribs	DEH; endocranial bone formation

**YORK OSTEOARCHAEOLOGY LTD**

75 Main Street • Bishop Wilton • York • YO42 1SR • Tel 01759 368483 • Mobile 07803 800806  
E-mail malinholst.yoa@gmail.com • Website : www.yorkosteoarch.co.uk

2215	18	Moderate	25-50%	N/A	N/A	Adolescent	15-20 yrs	Ad	-	-	-	-	-	L-S border shift; PNBF on L fibula and R tibia; possible pitting on L calcaneus	Proximal epiphysis on L 5th MT; L-S border shift; new bone formation on L fibula	PNBF (minimal)
2224	19	Good	50-75%	F?	F?	35+ yrs	35+ yrs	OMA/MA	-	-	Caries, AMTL, calculus, abscesses	Caries, abscesses, AMTL	DJC throughout skeleton; OA throughout skeleton; healed fracture R ulna; osteoma R temporal bone	Severe degenerative disease of the upper spine, elbow, wrist, hip and TMJ joints; healed fracture of the R ulna	Calculus; OA; osteoma	
2227	20	Moderate	25-50%	N/A	N/A	2-4 yrs	2-3 yrs	YJ	-	-	-	-	-	Extensive NBF on both femora; fusion of two cervican neural arches	Fusion of two cervical vertebrae; new bone formation on femora	-
2243	21	Good	75-100%	F?	F	30-40 yrs	30-40 yrs	YMA/OMA	-	166.79 (radius)	AMTL, congenital absence of M3s, calculus, periodontal disease, rotation of lower canines, DEH	Caries, impacted canine, congenital absence of two 3rd molars	Schmorl's nodes; residual rickets (bowing of femora and tibiae)	-	Numerous pathological changes (dental and post-cranial)	
2246	22	Moderate	1-25%	U	M?	Adult	Adult	Adult	-	184.96 (tibia)	-	-	-	PNBF R tibia	-	Sex estimation; PNBF
2251	23	Moderate	25-50%	N/A	N/A	4-6 yrs	3-5 yrs	YJ	-	-	DEH on unerupted permanent tooth crown	-	-	Fine porosity on the mandible	-	DEH; mandible
2258	24	Moderate	75-100%	F	F	26-35 yrs	25-35 yrs	YMA	161.34 (femur+tibia)	161.76 (femur+tibia)	Calculus, DEH, periodontal disease	-	-	PNBF on tibiae; pubis symphysis has unusual morphology and extensive ligamentous outgrowths/defined muscle attachments	-	Calculus, DEH, periodontal; PNBF

**YORK OSTEOARCHAEOLOGY LTD**

75 Main Street • Bishop Wilton • York • YO42 1SR • Tel 01759 368483 • Mobile 07803 800806  
E-mail malinholst.yoa@gmail.com • Website : www.yorkosteoarch.co.uk

2261	25	Good	75-100%	M	M	36-45 yrs	35-45 yrs	OMA	-	166.51 (femur+tibia)	AMTL, periodontal disease, caries, abscess, calculus	Caries, abscesses, AMTL	DDD in spine; infection of ilia; os acromiale; R MT1 shortened; possible ossified haematoma on L femur	Unusually small R MT1; os acromiale (bilateral); infection on pelvis	Periodontal; calculus; DDD; ossified haematoma
2269	26	Moderate	75-100%	N/A	N/A	5-7 yrs	5-7 yrs	YJ	-	-	Calculus, caries	Caries	Cribriform orbitalia; porosity/nbf on mandible; premature suture closure (sagittal); possible flaring/residual flaring of long bones of the lower limbs; pnb on tibiae	Premature fusion of the sagittal suture	Calculus; cribriform orbitalia; PNB; possible flaring (metabolic disease)
2313	27	Moderate	1-25%	N/A	N/A	13-17 yrs	13-17 yrs	Ad	-	-	Caries	Caries	-	-	-
2320	28	Poor	25-50%	U	U	Adult	Adult	Adult	-	-	AMTL	AMTL	DDD and DJC in spine	Degenerative disease of the spine	-
2333	29	Good	75-100%	M	M	36-45 yrs	40-50 yrs	OMA	166 (femur+tibia)	166.19 (femur+tibia)	Calculus, periodontal disease, abscess, DEH, caries	Caries, abscesses	Cribriform orbitalia; DDD, OA, and DJC throughout spine (severe); myositis ossificans distal end R tibia; healed fractures of L distal tibia and distal fibula, and L proximal fibula; OA/degeneration of MT1 (bilateral)	Os metastyloideum of MC3 (bilateral); degenerative disease of the spine; disruption of MT1 joints; healed fractures of L tibia and fibula	Calculus; periodontal disease; DEH; cribriform orbitalia; myositis ossificans R tibia; healed fracture L proximal fibula
2348	30	Moderate	75-100%	N/A	N/A	11-14 yrs	11-15 yrs	Ad	-	-	DEH	-	Myositis ossificans/supracondyloid process (?) on R humerus	Supracondylar process	-
2366	31	Poor	25-50%	M	M	46+ yrs	50+	MA	-	171.17 (humerus)	-	-	Two healed rib fractures (one right, one left); severe OA of the L hip, with possible slipped femoral epiphysis; DJC in spine; possible compression fracture/posterior dislocation of L4 and L5	Degenerative disease of the L hip; healed fracture of one R rib	Possible extra rib fracture; slipped femoral epiphysis; DJC in spine; possible trauma to lower lumbar

**YORK OSTEOARCHAEOLOGY LTD**

75 Main Street • Bishop Wilton • York • YO42 1SR • Tel 01759 368483 • Mobile 07803 800806  
E-mail malinholst.yoa@gmail.com • Website : www.yorkosteoarch.co.uk



---

**YORK OSTEOARCHAEOLOGY LTD**

75 Main Street • Bishop Wilton • York • YO42 1SR • Tel 01759 368483 • Mobile 07803 800806  
E-mail [malinholst.yoa@gmail.com](mailto:malinholst.yoa@gmail.com) • Website : [www.yorkosteoarch.co.uk](http://www.yorkosteoarch.co.uk)