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# Detailed assessment of a single human skeleton from Kilima Hotel, Holgate, York (site code: 1999.1177)

by

Stephen Rowland

**Summary**

*A single human inhumation and a small quantity of other vertebrate remains were recovered from a watching brief at Kilima Hotel, Holgate, York. The skeleton was found associated with iron hobnails and was of Roman date. It represents the well preserved remains of a subadult (16-18 year old) male, approximately 5'6" tall. The individual displayed bilateral asymmetry of the limb bones, a number of non-metric traits, and the incidence of minor pathological conditions.*

**Keywords:** KILIMA HOTEL, YORK; ROMAN; DETAILED ASSESSMENT; ANIMAL BONE; INHUMATION; HUMAN REMAINS; PATHOLOGY; MEASUREMENTS; NON-METRIC TRAITS

Authors' address:

Palaeoecology Research Services
Environmental Archaeology Unit
Department of Biology
University of York
PO Box 373
York YO10 5YW

Telephone: (01904) 433846/433843/434475
Fax: (01904) 433850

Prepared for:

On-Site Archaeology
25A Milton Street
York
YO10 3EP

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## Introduction

A single human skeleton and a very small amount of animal bone were recovered from a watching brief undertaken by On-Site Archaeology at Kilima Hotel, York (NGR SE 5899 5120) during 1999. The washed bones were submitted to the EAU for analysis. The skeleton was associated with hobnails in the region of the feet, and was thought to be of Roman date.

## Methods

The skeleton was examined in the EAU laboratory and, where necessary to gain biometric data, repairs and reconstruction were conducted with the aid of masking tape. Detailed notes were made of the skeletal elements present, and included metrical and non-metrical attributes, ageing and sexing criteria, and pathology, all of which were recorded using the methods outlined in Buikstra and Ubelaker (1994). Stature estimation was calculated using the methods outlined by Trotter and Gleser (1952 and 1958), as given in Brothwell (1972).

## Results

Table 1 shows the skeletal elements present. The skeleton was almost complete, including all of the limb bones, the pelvis, the feet and most of the hand bones. The smaller carpal bones were under-represented, and most of the medial and distal phalanges of the hands and feet were missing. It is probable that these smaller elements were present in the ground but not recovered, as the remains had been hand collected. The vertebrae were also under-represented, and the right scapula was missing completely. It is possible that these may have disintegrated *in situ* or been subjected to a high degree of fragmentation during recovery and washing.

Overall preservation of the skeleton was good. The long bones seemed well mineralised and dense, although there were a few fresh breaks and some degradation of the articular, metaphyseal and epiphyseal surfaces. Less dense elements, such as those of the hands, feet, pelves and vertebrae were more fragile, and displayed greater amounts of surface pitting into the underlying cancellous bone. The distal articular ends of the metacarpals and metatarsals were particularly badly affected. The cranium had collapsed into a large number of pieces. The clean surfaces of the broken fragments suggested that much of this damage had occurred during excavation and washing when the supporting sediment had been removed. As a result, the skull was easy to reconstruct.

Most of the bones were pale buff in colour, overlain by patches of dark brown mottling in varying densities and with a dry or matt appearance. Where the inner bone surface was exposed it was a creamy white colour. There was some damage to the outer bone surface, where it had flaked, accompanied by pitting and striations into the underlying bone surface. Overall, bone degradation appeared to have been caused by the loss of organic material from the bone rather than by acidic leaching of the osseous mineral salts.

### *Age determination*

Most of the characteristics used to age a skeleton were well preserved on this individual. It was possible to estimate an age from the tooth-wear and development, the state of epiphyseal fusion, closure of

cranial sutures, and the state of the pubic symphysis and the auricular surface.

Tooth development provides the most accurate age indication, and those of the skeleton were particularly well preserved (Table 2). There were no remaining deciduous teeth, and the third molar had not erupted (it may lie within its crypt, and be detectable by x-ray). All four second molars had erupted and were in occlusion. Overall, the teeth did not show a great deal of wear, merely polishing and some flattening of the enamel cusps. The M1 also showed limited wear, with no significant amounts of dentine exposure. The dental development therefore suggests an age of 15 years +/- 3 years.

This age was supported by the state of epiphyseal fusion and, although the individual's bones were not fusing in the typical order, the general trends can be observed (Table 3). Most diagnostic in this case was the distal epicondyle of the humerus (which should be completely fused by the age of about 16). By this point, the proximal radius, the femoral head and the epiphyses of the tibia should be undergoing fusion. The femoral trochanters generally do not start fusion before about the age of 17, but those of the Kilima skeleton had already almost completely done so. The teeth and the epiphyseal fusion together suggest an age of between 16 and 18 years old. The subadult age estimate for the individual was partly supported by the state of cranial suture closure, the corrugation of the pubic symphysis and the morphology of the auricular surface, which were more indicative of an individual in their early twenties, however. These latter criteria are more subjective and more variable than those relating to dental development and epiphyseal fusion and, an age between 16 and 18 years seems most reasonable for this individual.

*Sex determination*

The individual was sub-adult, and so many of the secondary sexual characteristics used in skeletal gender determination were likely to have been under-developed. The multi-point scheme advocated by Buikstra and Ubelaker (1994) suggests an individual of rather uncertain gender. The pelvic bones were generally masculine in appearance, as there was no ventral arc, subpubic concavity or preauricular sulcus (all of which are feminine characteristics). The sciatic notch was particularly narrow on the right innominate, but more middling on the left. The acetabula were wide, as were the femoral heads (again, more masculine traits). The rest of the post-cranial skeleton was not particularly robust, but considering the young age of the individual, this cannot be considered indicative.

The skull (Table 4) was less well developed than the pelvis, but does demonstrate early dimorphic traits. This was most prominent in the more protruding brow-ridge, linked with the growth of the frontal sinuses, and the bony ridges of the nuchal crest, associated with neck muscle development. The mastoids were also large, if a little narrow medio-laterally, and the mental eminence was fairly prominent. It seems, therefore, highly likely that the skeleton belonged to a young male.

An estimation of stature was possible using the right tibia. This bone was undamaged, and both proximal and distal epiphyses were fused. It was thus unlikely to undergo further longitudinal growth, and gave an indication of the adult stature of the individual. The calculation produced an estimate of 166 cm, or about 5'6".

An interesting feature of the skeleton was the bilateral asymmetry of many of the bones (Table 5). Many of the differences between the left and right side may be attributable to temporary uneven growth,

and few skeletons display true symmetry in terms of length or robustness of paired elements.

With the exception of the clavicle, measurements indicated that this differential development favoured the right side, where elements were generally slightly longer and more robust. This was most apparent from the bones of the arms. The right humerus was 8 mm longer than the left, and about 1 mm wider, while the right ulna was more than 3 mm longer and over 1 mm wider. Subjectively, the ulna proximal articular surface also appeared larger on the right side. The radii followed a similar pattern, as did the lower limb bones (but to a lesser extent).

It is possible that some of the development of the right arm was due to its greater usage during life, as there was a deep groove into the anterior surface of the humerus where the bicep and deltoid muscles were likely to have been attached. This feature was absent from the left side.

*Non-Metric Traits*

A full analysis of these characteristics can be found in Table 6. The most prominent of these was the retention of the metopic suture. This was in a similar state of fusion to the other major cranial sutures, and should normally have been obliterated by two years of age.

Also of interest was the presumed congenital absence of the upper lateral incisors. It is likely that the deciduous lateral incisors were never replaced, as the canine teeth fitted quite closely to the remaining medial incisor. Possible forward movement of the canines into this area was indicated by the wide spacing between the canines and the premolars. The third molars may also have been congenitally absent, as there was no surface indication of their presence. An x-ray would confirm this beyond doubt.

*Pathology*

On the whole, the skeleton displayed few pathological lesions. There were several small caries into the lower molars, both on the occlusal surfaces and on the medial surfaces of the crowns. They were relatively small and shallow, generally less than 1 mm in diameter, and penetrated about the same distance into the dentine. There was also some minor calculus development, particularly on the labial surfaces of the lower incisors, and onto the lingual surface of the lower right molars. There may have been some slight recession of the alveolar bone to reveal the necks of the tooth roots, but otherwise oral health seemed good.

All four canines showed some evidence of fairly modest pitted enamel hypoplastic lesions, all of which were at a similar height on the crown. Their position suggested that enamel deposition was arrested at some point between the ages of 3 and 5 years old. The causes of these lesions are multifarious and complex, but are generally considered to illustrate physiological stress episodes during tooth crown development (Ribot and Roberts 1996). In the case of this individual, they occurred too late to be associated with weaning, and may have been caused by a period of illness.

The proximal articular surfaces of both left and right proximal phalanges of the first (big) toe bore rounded depressions typical of osteochondritis. This seems a fairly common condition in this area of the foot, and probably relates to traumatic injuries such as severe toe stubbing.

There were also very slight exostoses to the dorsal margin of the distal articular surface (head) of both left and right tali,

although there was no corresponding reaction on the navicular bone.

*Other Anomalies*

There were several additional features that do not seem to have been pathological or congenital in origin. Firstly, several of the thoracic vertebrae bore a row of rounded depressions and longitudinal grooves horizontally across the centre of the vertebral body. These were 2 - 4 mm in height by up to 9 mm in length, and appeared to penetrate into the cancellous bone. This may be a developmental trait relating to the more extensive vascularisation of immature bone.

The surface of the temporal bone surrounding and posterior to the mastoids was particularly irregular. There appeared to be a series of semi-obliterated suture lines that had fused in a very disorganised manner. Again, this may have been a developmental condition, perhaps precipitated by congenital factors, as there are several additional sutural bones in this region of the skull of this individual (see Table 6). There were also fairly prominent Pacchionian Impressions on the inner surface of the skull, particularly on the parietal bones. These depressions are associated with the development of the arachnoid villi, which are involved with the removal of fluid form around the brain (Dible 1950). However, in this case the depressions were not so unusually wide or deep to be considered pathological.

*Non-human bone*

Also recovered were the fragmentary remains of the right innominate of an ovicaprid. This was well preserved and displayed chop marks on the ventral surface of the ilium. It is uncertain whether this was associated with the inhumation, but there are many examples of food offerings from Roman graves.

## Discussion

The skeleton represents the well preserved remains of a subadult (16-18 years old) male, about 5’ 6” tall. There was marked bilateral asymmetry that was probably the result of temporary uneven growth, but it is also possible that the individual favoured their right arm over the left for manual tasks. A brief period of illness during early childhood was indicated by the hypoplastic lesions on the canines. There were no direct indications as to the cause of death of the individual.

The low amount of wear to the molars suggests that this person ate little in the way of coarse foodstuffs. They may have eaten more sugary carbohydrates, perhaps from dried fruits etc., which would have encouraged the development of caries. Alternatively, without coarse food to wear down, and thus clean the occlusal surfaces, it would be easier for caries to develop. This pattern seems to be quite common for individuals of the Roman period, particularly those thought to be of higher status who could have afforded access to finer and more sugary foodstuffs.

On their own the nonmetric traits are little more than interesting curiosities, and one should beware of reading too much into a single skeleton. Such characteristics, as well as the other features of this individual, have the potential to be most informative when they can be analysed in relation to the rest of the population of Roman York. It is through palaeodemographic reconstruction that a greater appreciation of life and society, and of the position of an individual, can be made.

In all, it seems reasonable to suggest that this individual represents a young man

possibly of higher status, and with access to a good diet of finer foods.

## Archive

All material is currently stored in the Environmental Archaeology Unit, University of York, along with paper and electronic records pertaining to the work described here.

## Acknowledgements

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*Table 1. Skeletal elements present for the human skeleton from Kilima Hotel, Holgate York. Key: I = indeterminate, L = left, R = right, frag/s = fragment/s, vert/s = vertebra/e, phal/s = phalanx/phalanges, dist. = distal, prox. = proximal.*

| **Element** | **Kilima Skeleton** |
|---|---|
| Cranium | Fragmented - occipital, parietals, frontal, temporals, zygomatics mostly complete, sphenoid, basal and maxilla more fragmented. |
| Mandible | L and R tooth rows present, damage to left condyle. Fresh breakage. |
| Teeth | Lower M2-M2 present. Upper M2-M2 present except for left I1 (?post-mortem loss). M3 either congenitally absent or unerupted. |
| Cervical verts | Axis recognisable, three other complete vertebrae, fragments of the atlas. |
| Thoracic verts | Five were reasonably complete, one of which with neural arch broken off but present. |
| Lumbar verts | Three were reasonably complete. |
| Scapula | L scapula only present, consisting of the glenoid, the acromion and the lateral part of the blade. |
| Clavicle | L and R present, unfused epiphyses missing. Both with fresh breaks. |
| Sternum | Only the manubrium was present. |
| Rib | At least five left and four right dorsal ends, very fragmentary. |
| Humerus | Both present, proximal epiphyses missing, both with single fresh breakage. |
| Radius | Both present, R distal epiphysis missing. Both with a single fresh breakage. |
| Ulna | Both present, L and R distal epiphyses missing. L with single fresh break. |
| Carpals | Four out of six for the R hand. None from the L. |
| Metacarpal | All present for the L hand, three of which without heads, two present for R, one without a head. |
| Manual phalanges | Nine of twenty eight present, all proximal. |
| Pelvis | Both innominates present, with at least three fresh breakages each. Some loss of the pubic area, and of the ischium. Some fragments of the iliac epiphyses were also present. |
| Sacrum | All five sacral vert present, but fragmented. |
| Femur | Both femurs complete and relatively intact. The greater trochanter of the R femur was missing. |
| Patella | R present only. |
| Tibia | Both present and complete. |
| Fibula | R fibula proximal epiphysis missing. L fibula shaft only. |
| Tarsals | Complete set for L and R. |
| Metatarsal | Complete set for L and R, with some damage to distal ends. |
| Pedal phalanges | Twelve of twenty eight present. |

*Table 2. Tooth presence, wear and pathology. Key: presence: 2= present, 5= post-mortem loss, 6= congenital absence, 8= probably present but in crypt; caries: 1=on occlusal surface, 3=on side of crown; hypoplasias: describes nature and height above cemento-enamel junction.*

| Jaw | Tooth | Presence | Wear total | Caries | Calculus | Hypoplasias |
|---|---|---|---|---|---|---|
| R. Max | M3 | 8 | | | | |
| | M2 | 2 | 4 | 1 | | |
| | M1 | 2 | 10 | | | |
| | P2 | 2 | 1 | | | |
| | P1 | 2 | 2 | | | |
| | C | 2 | 2 | | Slight, buccal | Linear pits at 4.2 mm |
| | I2 | 6 | | | | |
| | I1 | 2 | 3 | | | |
| L.Max | I1 | 5 | | | | |
| | I2 | 6 | | | | |
| | C | 2 | 2 | | | Irreg. pits at 5.2mm |
| | P1 | 2 | 2 | | | |
| | P2 | 2 | 2 | | | |
| | M1 | 2 | 11 | | | |
| | M2 | 2 | 5 | | | |
| | M3 | 8 | | | | |
| L.Mand | M3 | 8 | | | | |
| | M2 | 2 | 6 | 1.1.3 | | |
| | M1 | 2 | 10 | 1.3 | | |
| | P2 | 2 | 3 | | | |
| | P1 | 2 | 3 | | | |
| | C | 2 | 1 | | | Irreg. pits at 5.3mm |
| | I2 | 6 | 2 | | Slight, buccal | |
| | I1 | 2 | 2 | | Moderate, buccal | |
| R.Mand | I1 | 2 | 2 | | Slight, buccal | |
| | I2 | 2 | 2 | | Moderate, buccal | |
| | C | 2 | 1 | | Slight, buccal | Irreg. pits at 5mm |
| | P1 | 2 | 2 | | | |
| | P2 | 2 | 2 | | | |
| | M1 | 2 | 11 | 1.3 | Slight, lingual | |
| | M2 | 2 | 5 | 1.1.3 | Slight, lingual | |
| | M3 | 8 | | | | |

*Table 3. State of epiphyseal fusion. Key: 0=metaphysis and epiphysis separate, 1=partial union, 2=complete union.*

| **Element** | **Epiphysis** | **Union stage (Left)** | **Union stage (Right)** |
|---|---|---|---|
| Cervical vert. | superior | 2 | |
| | inferior | 2 | |
| Thoracic vert. | superior | 0 | |
| | inferior | 0 | |
| Lumber vert. | superior | 0 | |
| | inferior | 0 | |
| Scapula | corocoid | | |
| | acromion | 0 | |
| Clavicle | sternal | 0 | 0 |
| Humerus | head | 0 | 0 |
| | distal | 2 | 2 |
| | medial epicondyle | 0 | 2 |
| Radius | proximal | 1 | 1 |
| | distal | 0 | 0 |
| Ulna | proximal | 2 | 2 |
| | distal | 0 | 0 |
| Innomiate | illiac crest | 0 | 0 |
| | ischial tuberosity | 0 | 0 |
| Femur | head | 1 | 1 |
| | greater trochanter | 1 | |
| | lesser trochanter | 1 | 1 |
| | distal | 0 | 0 |
| Tibia | proximal | 1 | 1 |
| | distal | 1 | 1 |
| Fibula | proximal | 0 | 0 |
| | distal | 0 | 0 |

*Table 4. Cranial Measurements. Measurement numbers pertain to Buikstra and Ubelaker (1994). Key: * = estimated measurements.*

| **Metric** | **Measurement (in mm)** |
|---|---|
| 1. Max cranial length | 183.9 |
| 2. Max cranial breadth | 141.0 |
| 3. Bizygomatic diameter. | 229.9 |
| 5. Cranial base length | 104.6 |
| 6. Basion-prosthion length | 90.2 |
| 7. Maxillo-alveolar breadth | 57.4 |
| 8. Maxillo-alveolar length | 47.3 |
| 9. Biauricular breadth | 116.6 |
| 10. Upper facial height | 69.0 |
| 11. Minimum frontal breadth | 100.9 |
| 12. Upper facial breadth | 105.2 |
| 13. Nasal height | 51.0 |
| 14. Nasal breadth | 23.5 |
| 15. Orbital breadth | 34.7 |
| 16. Orbital height | 33.7 |
| 17. Biorbital breadth | 97.7 |
| 18. Interorbital breadth | 28.6 |
| 19. Frontal chord | 111.4 |
| 20 Parietal chord | 109.0 |
| 21. Occipital chord | 94.3* |
| 22. Foramen magnum length | 37.6* |
| 24. Mastoid length | 28.4 |
| 25. Chin height | 31.0 |
| 26. Height of the mandibular body | 28.3 |
| 27. Breadth of the mandibular body | 10.7 |
| 28. Bigonial width | 96.0 |
| 30. Minimum ramus breadth | 28.3 |
| 31. Maximum ramus breadth | 39.3 |
| 32. Maximum ramus height | 55.4 |
| 33. Mandibular length | 70.0* |

*Table 5. Post-cranial metrical data. Key: D= diaphysis only, F= both epiphyses fused, PF= proximal epiphysis fused only, DF = distal epiphysis fused only. Metric numbers pertain to those in Buikstra and Ubelaker (1994). All measurements in mm.*

| **Measurement** | **Left fusion** | **Left Metric** | **Right fusion** | **Right** |
|---|---|---|---|---|
| 35. Clavicle: max. length. | D | 133.4 | D | 136.4 |
| 36. Clavicle: ant-post midshaft diam. | D | 13.1 | D | 12.7 |
| 37. Clavicle: sup-inf midshaft diam. | D | 8.9 | D | 8.1 |
| 40. Humerus: max. length. | DF | 287.0 | DF | 295.0 |
| 41. Humerus: epicondylar breadth. | | | DF | 60.6 |
| 43. Humerus: max. midshaft diam. | DF | 19.2 | DF | 20.5 |
| 44. Humerus: min. midshaft diam. | DF | 15.4 | DF | 16.1 |
| 45. Radius: max. length. | PF | 211.5 | PF | 214.2 |
| 46. Radius: ant-post midshaft diam. | PF | 11.2 | PF | 11.6 |
| 47. Radius: med-lat midshaft diam. | PF | 13.4 | PF | 14.5 |
| 48. Ulna: max. length. | PF | 231.5 | PF | 235.0 |
| 49. Ulna: ant-post diam. | PF | 10.9 | PF | 12.1 |
| 50. Ulna: med-lat diam. | PF | 14.3 | PF | 15.2 |
| 56. Innomiate height | D | | D | 196.8 |
| 57. Innomiate: illiac length | D | | D | 141.4 |
| 60. Femur: max. length | PF | 422.0 | PF | 416.0 |
| 63. Femur: max. head diam. | PF | 45.9 | PF | 46.9 |
| 64. Femur: ant-post sub.troch. diam | PF | 21.5 | PF | 22.1 |
| 65. Femur: Med-lat. sub-troch. diam. | PF | 30.9 | PF | 31.1 |
| 66. Femur: midshaft ant-post. diam. | DE | 24.7 | PF | 25.5 |
| 67. Femur: midshaft med-lat. diam. | DE | 24.1 | PF | 24.3 |
| 69. Tibia: Length | F | 346.0 | F | 348.0 |
| 70. Tibia: max prox. epiph. breadth. | F | 69.8 | F | 71.0 |
| 71. Tibia: max dist. epiph. breadth. | F | 45.4 | F | 46.8 |
| 72. Tibia: max. diam at foramen base. | F | 30.7 | F | 31.8 |
| 73. Tibia: min. diam at foramen base. | F | 21.7 | F | 21.6 |
| 75. Fibula: max length. | D | 297 | D | 300.0 |
| 77. Calcaneous: max. length. | F | 76.5 | F | 76.6 |
| 78. Calcaneous: middle breadth. | F | 39.2 | F | 38.8 |

*Table 6. Primary non-metric traits.*

| **Non-Metric Trait** | **Presence Left Side** | **Presence Medially** | **Presence Right side** |
|---|---|---|---|
| 1. Metopic suture | | Complete presence | |
| 2a. Supraorbital notch | Present, <half occluded by spicules | | Present, <half occluded by spicules |
| 2b. Supraorbital foramen | Absent | | Absent |
| 3. Infraorbital suture | Absent | | Absent |
| 4. Multiple infraorbital foramina | Unobservable | | Unobservable |
| 5. Zygomatic facial foramina | 1 small | | 1 small |
| 6. Parietal foramen | Absent | | Present on parietal |
| 7a. Epipteric bone | Absent | | Absent |
| 7b. Coronal ossicle | Absent | | Absent |
| 7c. Bregmatic bone | | Absent | |
| 7d. Sagittal ossicle | | Absent | |
| 7e. Apical bone | | Absent | |
| 7f. Lambdoid ossicle | Absent | | Absent |
| 7g. Asterionic bone | Present | | Present |
| 7h. Ossicle in occipito-mastoid suture | Unobservable | | Absent |
| 7i. Parietal notch bone | Present | | Present |
| 8. Inca bone | | Absent | |
| 9. Condylar canal | Patent | | Patent |
| 10. Divided hypoglossal canal | Complete internally. | | Absent |
| 11. Flexure of superior sagital sulcus | | Unobservable | |
| 12. Foramen ovale incomplete | Unobservable | | Unobservable |
| 13. Foramen spinosum incomplete | Unobservable | | Unobservable |
| 14. Pterygo-spinous bridge | Unobservable | | Unobservable |
| 15. Pterygo-alar bridge | Unobservable | | Unobservable |
| 16. Tympanc dihiscence | Absent | | Absent |
| 17. Auditory exostosis | Absent | | Absent |
| 18. Mastoid foramen | Unobservable | | 1 Present on temporal |
| 19. Mental foramen | Single | | Single |
| 20. Mandibular taurus | Absent | | Absent |
| 21. Mylohyoid bridge | Absent | | Absent |
| 22. Atlas bridging | Unobservable | | Unobservable |
| 23. Accessory transverse foramina | Unobservable | | Unobservable |
| 24. Septal aperture | Absent | | Absent |