8.2.3 The Roman Inhumations

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Introduction

Excavations south of Church Road recovered 87 inhumations from a Roman period cemetery.

The burials were notable for the presence of twelve individuals who had been the object of ritual decapitation. The 'special' nature of such interments was indicated by the location of four of them within their own rectangular or circular ditched enclosure. Burial with the head placed away from its usual position was highlighted by Philpott (1991) as a relatively common practice, found in more than 70 rural cemeteries dating to the late Roman period in Britain. Such interments occur particularly in the lowland area bordered by the River Severn and the Wash, from Dorset in the South to Cambridgeshire in the East. They are also found, although less frequently, on urban sites such as Winchester (Clarke 1979), Poundbury (Farwell and Molleson 1993) and Cirencester (Wells 1982). Prone burial was regularly practiced at Kempston (12 individuals or 13.7% of the inhumations, including one adolescent) and the association between prone burial and decapitation has been mentioned by Harman (Harman *et al.* 1981). However, only one male from south of Church Road had been given both burial rites (Inh 3906). Most people were interred in supine extended fashion (50 of 89, or 57.5%) which is considered to have been the normal position at this period, although one infant and one juvenile aged between 9 and 10 years were in crouched mode. Grave goods were few in number and the ratio of child to adult burials was lower than expected with only nine discrete juvenile inhumations recovered.

The Inhumations

Key to abbreviations

/:	lost post-mortem
r:	root only
x:	lost ante-mortem
e:	erupting
np:	not present
u:	unerupted
—	jaw not present
a:	abscess
c:	caries

Infant < 1 year old
Subadult < 18 years old
Young adult 18 - 25 years
Young/middle adult 26 - 35 years
Middle adult 36 - 45 years
Mature adult 46 years and older
Adult >25 years (all epiphyses fused)
(all ages are approximate)

Inhumation 3901 (Phase 5, L90)

Female, young adult, 156.5cm ± 3.55cm (femur + tibia).
Decapitated burial. Supine, extended.
Preservation: Good. Almost all bones present apart from sternum and a few hand and foot bones. Fragmentary skull.
Dentition:

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8/6543x1 1x345678
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/7654321 12345678
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General pathology: Cut marks on anterior aspect of axis vertebra, whose posterior arches have been split by post-mortem transection.
Dental pathology: Slight enamel hypoplasia 2/28, calculus 14/28, congenital absence of maxillary lateral incisors. Probable impacted right mandibular third molar.
Non-metric traits: Left mastoid foramen extrasutural, right foramen ovale incomplete, right Allen's fossa, left vastus notch, bilateral os trigonum, right anterior calcaneal facet absent, double left anterior calcaneal and talar facets, bilateral peroneal tubercles.

Inhumation 3902 (Phase 3, L86)

Male, mature adult, stature 172.7cm ± 4.05cm (humerus)
Prone, flexed.
Preservation: Fair. Most bones present but cranium, ribs, vertebrae and pelvis fragmentary. Sternum, tibiae, fibulae and feet missing.
Dentition:

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c  cr       c
8-x54321 1234xx7/
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87654321 12345678
c
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General pathology: Osteoarthritis of right hip and right acromioclavicular joint. Fractures of right clavicle and one left rib. Left cribra orbitalia. Left maxillary sinusitis and two oro-antral fistulae probably due to dental disease. Osteophytosis of left hip and spine. Schmorl's nodes. Enthesopathy of triceps insertion on right ulna and both patellar ligaments. Porosity of left rotator cuff.
Dental pathology: Calculus 19/27, hypoplasia 1/27, caries 4/27, antemortem tooth loss, considerable periodontal disease.
Non-metric traits: Mastoid foramina extrasutural, right double zygomaticofacial foramen, left bridging of supraorbital notch and supraorbital foramen, right plaque, bilateral exostosis in trochlear fossa.

Inhumation 3903 (Phase 5, L90)

Female, young adult, stature 158.0cm ± 3.55cm (femur + tibia).
Decapitated, supine, extended.
Preservation: Excellent. Almost all bones present apart from sternum, manubrium, a few vertebrae and a few hand bones.
Dentition:

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--6543// 1234x-7-
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87654321 12345678
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General pathology: Post-mortem transection of 4th cervical vertebral body with loss of left lamina and apophyseal facet joints. Os acromiale of right scapula, spina bifida of 3rd - 5th sacral vertebrae, spondylolysis of 5th lumbar vertebra. Osteochondritis dissecans of left distal femur and right 1st metatarsal. Fracture of left mandibular condyle.
Dental pathology: Calculus 18/23, hypoplasia 1/23, crowding of mandibular incisors with right central incisor situated behind the left one.
Non-metric traits: Right zygomaticofacial foramen, right hypotrochanteric fossa, single anterior talar and calcaneal facets, transverse foramen bipartite (C6).

Inhumation 3904 (Phase 5, L90)

Subadult, 9 - 10 years.
Supine, extended.
Preservation: Fair. Most bones present apart from cranium, foot

bones, manubrium, pubic bones, distal tibiae and fibulae and some hand bones.
Dentition:

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---c-l ------
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------ -----/78
            u u
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Inhumation 3905 (Phase 5, L90)

Female, middle adult, stature 163.6cm ± 3.37cm (femur + tibia).
Decapitated, supine, extended.
Preservation: Excellent. All bones present apart from sternum, some hand and foot bones. Cranium slightly fragmented.
Dentition:

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87654321 12345678
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87654321 12345678
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General pathology: Post-mortem transection of antero-inferior edge of 5th cervical vertebra, 6th missing. ?post-mortem cut through top of C7 removing superior left apophyseal facet. Bilateral maxillary sinusitis. Pseudarthrosis between left calcaneus and navicular. Osteoarthritis of joint between 4th and 5th lumbar vertebrae probably due to malformation of left sacral facet joint. Osteophytosis of left glenoid, spine, one right and five left rib tubercles. Schmorl's nodes. Enthesopathies of Achilles tendon on both calcanei, right patellar ligament and rotator cuff insertions on both humeri.
Dental pathology: Calculus 32/32, hypoplasia 1/32, moderate periodontal disease.
Non-metric traits: Mastoid foramina absent, posterior condylar canals open, bridging of right supraorbital notch, accessory supraorbital foramen, right plaque, exostosis in left trochlear fossa, right tibial squatting facet, right lateral talar extension, single anterior talar and absent calcaneal facets.

Inhumation 3906 (Phase 5, L90)

Male, young/middle adult, stature 177.2cm ± 2.99cm (femur + tibia).
Decapitated, prone, extended.
Preservation: Good. All bones present apart from some ribs, both ends of left ulna, some vertebrae, some hand and foot bones.
Dentition:

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87654321 12345678
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87654321 12345678
c c
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General pathology: Cut marks on inferior aspect of 5th cervical vertebral body, possible cut mark on superior surface of body which has removed left superior apophyseal joint. Probable cut mark through the 6th cervical vertebral body. Cut mark on right humeral head with slight attempt at healing. Trauma to lumbo-sacral joint. Periostitis of left tibia. Spina bifida occulta of 4th and 5th sacral vertebrae. Fracture of 3rd left rib. Osteophytosis of both rotator cuffs (subscapularis insertion) and spine.
Dental pathology: Calculus 27/32, caries 2/32, moderate periodontal disease.
Non-metric traits: Right mastoid foramen absent. Bridging of supraorbital notches. Bilateral plaque, hypotrochanteric fossae, exostoses in trochlear fossae, acetabular creases, double anterior talar and calcaneal facets, right posterior atlas bridge, transverse foramina bipartite C5 - C7.

Inhumation 3907 (Phase 5, L90)

Female, young adult, no complete long bones.
Disarticulated.
Preservation: Very poor. Bones present: Most of cranial vault, fragment of maxilla, right clavicle, a few ribs and vertebrae, part of left scapula and radius, part of right ulna, both femoral heads and shafts, a few foot bones.
Dentition: Right maxillary M1 and M2, left maxillary and mandibular canines.
General pathology: Deltoid enthesopathy of right clavicle. Schmorl's nodes.
Dental pathology: Calculus 2/4.
Non-metric traits: Right posterior condylar canal open, incomplete foramina ovale, precondylar tubercle, accessory supraorbital foramen, hypotrochanteric fossae.

Inhumation 3908 (Phase 5, L90)

Male, middle adult, stature 167.3cm ± 2.99cm (femur + tibia), cranial index, 81.1.
Preservation: Excellent. All bones present apart from sternum, part of sacrum and some hand and foot bones.
Dentition:

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np                a np
87X54321 /2345678
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87654/21 12345678
np              np
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General pathology: Periostitis of visceral surfaces of 5th - 12th left ribs inclusive. Periostitis of right tibia. Osteophytosis of right humeral head; also of thoracic and lumbar vertebrae. Schmorl's nodes.
Dental pathology: Calculus 10/28, abscess, non-eruption of third molars, rotation of maxillary right first premolar.
Non-metric traits: Lambdoid and coronal ossicles, parietal foramina, mastoid foramina extrasutural, double right anterior condylar foramen, double anterior calcaneal and talar facets.

Inhumation 3909 (Phase 3, L86)

Male, young/middle adult, no complete long bones.
Disarticulated.
Preservation: Very poor. Bones present: Most of cranium and maxilla, some left ribs, right femoral and tibial shafts.
Dentition:

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?np
87654/// /////678
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no mandible
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General pathology: Periostitis of right tibia.
Dental pathology: Calculus 3/6.
Non-metric traits: Lambdoid ossicles, left mastoid foramen extrasutural, right posterior condylar canal open, accessory supraorbital foramen, right hypotrochanteric fossa, right third trochanter.

Inhumation 3910 (Phase 3, L86)

Subadult, 9 - 10 years
Crouched
Preservation: Fair. Most bones present apart from ribs, vertebrae, sternum, most of left pelvis and hand bones.
Additional bones: Infant petrous temporal.
Dentition:

```
u  ee            u
76e4321 12c4e67
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76edc21 12cde6-
u c
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General pathology: Infection and possible fracture of right tibia.
Dental pathology: Calculus 3/24, hypoplasia 9/24, caries 1/27.
Non-metric traits: Tripartite ossicle at lambda, lambdoid ossicles, metopic suture, double right zygomaticofacial foramen.

Inhumation 3911 (Phase 5, L90)

Female, young/middle adult, 157.5cm ± 3.66cm (tibia)
Supine, extended.
Preservation: Poor. Bones present: Part of cranium, both humeral shafts, right clavicle and part of scapula, manubrium, right radial and ulnar shaft fragments, most right hand bones, fragment of right pelvis, both femoral shafts and distal femora, right tibia and fibula, most of left tibia and fibula, most foot bones.
Dentition:

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              c
876-4321 1234-678
-----------------
8-6-4321 1234-6-8
              c
```

General pathology: Probable osteomalacia.
Dental pathology: Moderate enamel hypoplasia 3/26, calculus 10/26, caries 2/26.
Non-metric traits: Double left zygomaticofacial foramen, hypotrochanteric fossae, tibial squatting facets, double anterior calcaneal and talar facets, right peroneal tubercle.

Inhumation 3912 (Phase 3, L86)

Male, young/middle adult, 166.8cm ± 2.99cm (femur + tibia).
Supine, extended.
Preservation: Good. Almost all bones present apart from part of sternum and some hand and foot bones. Skull and ribs fragmentary.
Dentition:

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   ar
87654321 12345x78
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87x54321 12345678
np             np
```

General pathology: Spiral fracture of left radius, right maxillary sinusitis, periostitis of left tibia, spina bifida occulta of 5th sacral vertebra, spinal osteophytes.
Dental pathology: Calculus 15/28, caries 1/28, abscess, crowding of right maxillary canine by retained deciduous canine forcing permanent canine behind lateral incisor. Rotation of left lateral incisor.
Non-metric traits: Auditory tori, mastoid foramina extrasutural, posterior condylar canals open, left double anterior condylar canal, zygomaticofacial foramina, right accessory infraorbital foramen, bilateral plaque, hypotrochanteric fossae, double anterior talar and condylar facets.

Inhumation 3913 (Phase 3, L86)

Female, mature adult, no complete leg bones.
Supine, extended.
Preservation: Good. Most bones present apart from facial bones, left distal humerus, some hand and foot bones. Cranium, ribs and pelvis fragmentary.
Dentition:

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no maxilla
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--x////x xx///xxx
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General pathology: Fracture of right clavicle and left fibula. Degeneration of rotator cuffs on both humeri. Osteophytosis of two left rib tubercles and left 12th rib head. Right deltoid enthesopathy on clavicle.
Dental pathology: Ante-mortem tooth loss, considerable periodontal disease.
Non-metric traits: Exostoses in both trochlear fossae, tibial squatting facets, single anterior calcaneal and talar facets, peroneal tubercles.

Inhumation 3914 (Phase 5, L90)

? Male, young/middle adult, no complete long bones
Decapitated, supine, extended.
Preservation: Very poor. Bones present: Most of cranial vault, teeth, both humeral radial and ulnar shafts, a few hand bones, parts of both pelves, most foot bones.
Dentition:

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  r          r
--654--1 123456--
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-7654321 12-45678
             c
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General pathology: No skeletal evidence for decapitation but all vertebrae have disintegrated.
Dental pathology: Caries 3/24.
Non-metric traits: Single anterior calcaneal and talar articular surfaces.

Inhumation 3915 (Phase 3, L86)

Male, middle adult, stature 162.5cm ± 3.37cm (tibia)
Supine, lying on side
Preservation: Good. Almost all bones present apart from proximal right humerus, some hand bones and almost all foot bones. Cranium and ribs fragmentary.
Dentition:

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---//321 123//x--
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-7x54321 12345678
 ac          ccc
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General pathology: Enthesopathies of both patellae (patellar ligament), both tibiae (soleal line), both iliac crests (quadratus lumborum), right radius (radial tuberosity) and left rotator cuff with bicipital tendonitis. Osteophytosis of right distal ulna, 6 right and 4 left rib tubercles, both acetabula, proximal hand phalanges, spine and both medial clavicles. Six sacral vertebrae. Schmorl's nodes.
Dental pathology: Calculus 10/20, caries 4/20, considerable periodontal disease.
Non-metric traits: Left zygomaticofacial foramen, right tibial squatting facet, right acetabular crease, circumflex sulci, left single anterior talar facet.

Inhumation 3916 (see Inhumation 3923)

Inhumation 3917 (Phase 3, L86)

Female, young/middle adult, stature 156.5cm ± 3.55cm (femur + tibia).
Supine, extended.
Preservation: Good. All bones present apart from a few hand and foot bones. Bone surface slightly eroded.
Dentition:

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8765432/ /234/678
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87654321 12345678
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General pathology: Os acromiale of left scapula. Bilateral cribra orbitalia (grade 2 left orbit; grade 3 right orbit).
Dental pathology: Calculus 12/29, hypoplasia 7/29.
Non-metric traits: Double zygomaticofacial foramina, hypotrochanteric fossae, right tibial squatting facet, septal apertures, single anterior talar and calcaneal facets.

Inhumation 3918 (Phase 3, L86)

Female, middle adult, stature 170.9cm ± 3.72cm (femur).
Supine, flexed.
Preservation: Good. Almost all bones present apart from a very small number of hand and foot bones. Cranium and ribs badly fragmented otherwise bone condition is good.
Dentition:

```
c         aa    aa
8-654321 123456xx
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87654321 12345678
np  c           np
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General pathology: ?partial spondyloysis of 5th lumbar vertebra. Osteoarthritis of tarsal joints of feet ? secondary to disruption of foot architecture. Enthesopathies of tibialis posterior on both tibae, rotator cuffs on both humeri and pronator quadratus on both ulnae. Osteophytosis of 3 right and 2 left rib tubercles, spine and both acetabula. Schmorl's nodes. Periostitis on left tibia. Left maxillary sinusitis.
Dental pathology: Calculus 27/27; hypoplasia 2/27, caries 2/27, abscesses, moderate periodontal disease, hypercementosis of maxillary left first and second incisors.
Non-metric traits: Left parietal foramen. Mastoid foramina extrasutural. Right double anterior condylar canal, mandibular tori, single right and triple left zygomaticofacial foramina, bilateral bridging of supraorbital notch, exostoses in trochlear fossae and septal apertures. Single anterior talar facets, absent anterior calcaneal facets, double right atlas facet.

Inhumation 3919 (Phase 3, L86)

Male, young adult, 162.4cm ± 2.99cm (femur + tibia).
Supine, extended.
Preservation: Good (2). Skull and some ribs fragmentary. All bones present apart from part of left scapula, sacrum, right patella and a few hand and foot bones.
Dentition:

8 7 6 5 4 3 2 1 /2 3 4 5 6 - -
----
8 7 6 5 4 3 2 1 1 2 3 4 5 6 7 8

General pathology: Bilateral Achilles tendon and left patellar ligament enthesopathies. Osteophytosis of one right and one left rib tubercle. Schmorl's nodes.
Dental pathology: Calculus 23/27, enamel hypoplasia 4/27 and periodontal disease.
Non-metric traits: Bregmatic bone, metopic suture, bilateral parietal foramina, single anterior calcaneal and talar facets, transverse foramina bipartite (C6).

Inhumation 3920 (Phase 4, L88)

Male, young/middle adult, stature 175.2cm ± 2.99cm (femur + tibia).
Decapitated, supine, extended.
Preservation: Good. All bones present apart from a few vertebrae, sternum and manubrium, left proximal radius and ulna, right patella and a few hand and foot bones. Cranium and ribs slightly fragmented. Bone condition good.
Dentition:

c
- 7 6 5 4 3 2 1 1 2 3 4 5 6 7 8
----
8 7 6 5 4 3 2 1 1 2 3 4 5 6 7 8

General pathology: No obvious osteological evidence for decapitation. Left half of 4th cervical missing post-mortem although the break is irregular. The cut may have nicked the inferior aspect of C3. Recent fracture of one rib (? side) with callus formation. Left cribra orbitalia (Stuart-Macadam grade 2). Periostitis of both tibiae. Os styloideum of left ulna. Porosity of both lateral clavicles. Diffuse porosity on occipital and frontal bones. Schmorl's nodes.
Dental pathology: Calculus 22/31, hypoplasia (1/31), caries 1/31, moderate periodontal disease.
Non-metric traits: Right mastoid foramen extrasutural, bilateral plaque, tibial squatting facets, right os trigonum, single anterior talar and calcaneal facets, left lateral talar extension.

Inhumation 3921 (Phase 5, L90)

Male, young/middle adult, 168.2cm ± 2.99cm (femur + tibia).
Supine, extended.
Preservation: Good. Most bones present apart from skull (stolen from site), first and second ribs, cervical and upper thoracic vertebrae (apart from atlas), manubrium, some hand and foot bones.
General pathology: partial sacralization of 5th lumbar vertebra without fusion but with right-sided torsion. Spina bifida occulta of 5th lumbar, 1st, 4th and 5th sacral vertebrae. Cyst in left 12th rib. Osteophytosis of both humeral heads. Right patellar ligament enthesopathy. Cortical defect at insertion of pectoralis major.
Non-metric traits: Hypotrochanteric fossae, left third trochanter, tibial squatting facets; single anterior calcaneal and talar facets.

Inhumation 3922 (Phase 3, L86)

Male, young adult, stature 164.2cm ± 2.99cm (femur + tibia).
Supine.
Preservation: Excellent. All bones present apart from a few hand and foot bones.
Dentition:

e
8 7 6 5 4 3 2 1 1 2 3 4 5 6 7 8
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8 7 6 5 4 3 2 1 1 2 3 4 5 6 7 8

General pathology: Spina bifida occulta of entire sacrum. Cranial sutures have fused slightly prematurely and asymmetrically, causing exaggerated bossing of the frontal bones and asymmetry of parietal bossing. Moderate bilateral cribra orbitalia and diffuse porosity of ectocranial surface. Schmorl's nodes.
Dental pathology: Hypoplasia 1/32, calculus 17/32, enamel pearls on both sides of right maxillary M2 and mesial aspect of right maxillary M3. Crowding of mandibular incisors with clockwise rotation of left lateral incisor. Slight crowding of left maxillary lateral incisor. Right maxillary M3 projects buccally.
Non-metric traits: Metopic suture, ossicle at lambda, lambdoid, coronal and right parietal notch ossicles, mastoid foramina extrasutural, right bridging of supraorbital notch, hypotrochanteric fossae, sternal foramen, single anterior calcaneal and inferior talar facets, right transverse foramen bipartite (C6).

Inhumation 3923 (Phase 3, L86)

Male, young adult, stature 165.5cm ± 2.99cm (femur+ tibia).
Supine, extended.
Preservation: Fair. All bones present apart from right scapula, humerus, radius and ulna, right ribs, manubrium, sternum, most vertebrae and both patellae.
Dentition:

- /6 /4 3 x 1 /x 3 4 5 6 7 8
----
8 7 6 5 4 3 x / x x 3 4 5 6 7 8

General pathology: Antero-posterior bowing of both tibiae with retroversion and eversion of tibial condyles. Right tibia is thickened with periostitis. Teres major enthesopathy of right humerus. Schmorl's nodes.
Dental pathology: Hypoplasia 3/23, calculus 5/29, ante-mortem tooth loss. Congenital absence of all lateral incisors. Rotation of right maxillary canine.
Non-metric traits: Mastoid foramina extrasutural, right incomplete foramen ovale, double zygomaticofacial foramina, hypotrochanteric fossae, tibial squatting facets, single anterior calcaneal and talar facets.

Inhumation 3924 (Phase 3, L86)

Male, young/middle adult, stature 169.1cm ± 2.99cm (femur + tibia).
Supine, extended.
Preservation: Good. Most of burial well preserved. However, most ribs, all cervical and thoracic vertebrae are missing as well as sternum, manubrium and some hand bones. Cranium fragmentary.
Dentition:

r a c
/7 6 5 4 3 2 1 1 2 3 4 5 6 7 8
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8 7 6 5 4 3 2 1 1 2 3 4 5 6 7 8

General pathology: Slight, diffuse porosity of ectocranial surface of parietals and frontal bone. Enthesopathies of soleus on both tibiae, ligaments on proximal phalanges and left sacro-iliac interosseous ligament.
Dental pathology: Calculus 28/30, hypoplasia 3/30, caries 2/30, abscess, severe crowding of left mandibular first premolar and clockwise rotation of right mandibular canine. Torus on buccal aspect of mandible by central incisors.
Non-metric traits: Highest nuchal line, right posterior condylar canal open, mandibular tori, triple right and double left zygomaticofacial foramina, bilateral bridging of supraorbital notch, accessory supraorbital foramen, bilateral plaque, tibial squatting facets, acetabular creases, right vastus notch, right lateral talar extension, single anterior talar and calcaneal facets, right peroneal tubercle, bilateral calcaneus secondarius.

Inhumation 3925 (Phase 4, L88)

Female, mature adult, no complete long bones.
Prone, extended.
Preservation: Poor. Bones present: right maxilla, both clavicles and right scapula, both humeral, radial and ulnar shafts, some ribs and vertebrae, fragmentary pelvis, both proximal femora, left fibular shaft.

Dentition:

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/76/4/// --------
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no mandible
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General pathology: Spondyloysis of 4th lumbar vertebra, spondylolisthesis of 4th/5th lumbar vertebral interface. Osteoarthritis of one right and one left costovertebral joint. Osteoporosis of vertebral bodies. Enthesopathy of biceps insertion on right radius, bilateral deltoid enthesopathies, osteophytosis of left acetabulum and spine. Schmorl's nodes.

Inhumation 3926 (compatible with disarticulated bone from fill in size and preservation) (Phase 3, L86)

Male, middle adult, stature 179cm ± 3.27cm (femur).
Supine.
Preservation: Fair. Bones present: Cranium, left mandible, both clavicle shafts, left humerus, radius and ulna, right humerus (without proximal end), a few hand bones, 8 fragmentary vertebral bodies, pelvis, both femora, right tibial and fibular shafts, left fibula, left tibia (possibly from another individual), some foot bones.
Dentition:

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87654321 1/345/x-
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87654321 1/345678
              cc
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General pathology: Osteoarthritis of right hip, osteophytosis of left hip. Complete sacralization of 5th lumbar vertebra. Achilles tendon enthesopathies.
Dental pathology: Calculus 9/27, caries 2/27, considerable periodontal disease.
Non-metric traits: Parietal foramina, left zygomaticofacial foramen, left plaque, hypotrochanteric fossae, acetabular creases, single anterior talar and calcaneal facets.

Inhumation 3927 (Phase 3, L86)

Male, mature adult, 169.8cm ± 3.37cm (tibia).
Supine, flexed.
Preservation: Fair. Most bones present. However, vertebrae, sacrum and ribs have almost disintegrated. Only part of pelvis and scapulae remain. Some hand and foot bones are also missing.
Dentition:

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      ar  r
--xxxx/1 /2xx5xxx
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xxxx432x /23xxx7/
         r
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Skeletal pathology: Osteitis of right femur; osteitis and periostitis of left tibia and fibula. Fracture of one left rib. Osteoarthritis (? secondary to underlying disease process) of right hip and left wrist. Left patellar ligament enthesopathy; triceps enthesopathy. Cortical defect in right pectoralis major insertion.
Dental pathology: Ante-mortem tooth loss, abscess, caries 3/9, severe periodontal disease.
Non-metric traits: Parietal foramina, right ossicle at parietal notch, right mastoid foramen extrasutural, left plaque, left hypotrochanteric fossa, single anterior calcaneal and talar facets.

Inhumation 3928 (Phase 3, L86)

Female, mature adult, stature 157.1cm ± 3.72cm (femur).
Preservation: Good. All bones present apart from a few hand and foot bones. Skull, ribs and scapulae are fragmentary.
Dentition:

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  r   r  r
--x54x21 12345xxx
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xx654321 12345xxx
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General pathology: Hyperostosis frontalis interna. Spina bifida occulta of 4th and 5th sacral vertebrae. Osteoarthritis of cervical and lumbar vertebrae; also of 1st metacarpo-phalangeal and 1st and 3rd interphalangeal joints. Osteophytosis of right knee joint and both acetabula and spine. Schmorl's nodes. Enthesopathies of both soleal lines, both linea aspera, patellar ligaments, Achilles tendons and ischial tuberosities; also on right radial tuberosity and right iliac crest. Ossified cartilage on right 1st rib and sternum. Ossification of anterior longitudinal ligament on spine. Diffuse idiopathic skeletal hyperostosis.
Dental pathology: Antemortem tooth loss, severe periodontal disease, caries 3/20.
Non-metric traits: Right mastoid foramen extrasutural, left posterior condylar canal open; left exostosis in trochanteric fossa, right squatting facets, right septal aperture, single anterior talar facets.

Inhumation 3929 (Phase 5, L90)

Male, middle adult, stature 165.0cm ± 2.99cm (femur + tibia).
Supine, extended.
Preservation: Fair. Most bones are present apart from all ribs, thoracic and lumbar vertebrae, sacrum and left fibula. Fragmentary skull. Only parts of scapulae and pelvis remain; some hand and foot bones are also missing.
Dentition:

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   c
x7x5432/ 12345xx-
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8xx54321 123456xx
            c
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General pathology: Osteophytosis of right acetabulum, porosity of left lateral clavicle.
Dental pathology: Ante-mortem tooth loss, calculus 6/20, caries 2/20, severe periodontal disease, heavy wear on incisors and canines.
Non-metric traits: Lambdoid ossicles, ossicle at left asterion, right mastoid foramen extrasutural, bilateral plaque, left tibial squatting facets, single anterior calcaneal and talar facets, right transverse foramina bipartite (C5 and C6).

Inhumation 3930 (Phase 3, L86)

Male, adult, no complete long bones..
Supine, extended.
Preservation: Very poor. A disarticulated collection of human bone intermingled with animal bone and some bones from other inhumations. Bones present: part of occipital bone, mandible, both humeral shafts, right proximal radius and ulna, left radius and ulna, a few hand bones, part of right pelvis and 1st sacral vertebra, 4th and 5th lumbar vertebrae, both femoral and tibial shafts, left fibula.
Additional bones: Mandibular fragment, 5 subadult cranial fragments, 3 lumbar vertebrae, right distal tibia, distal fibular fragments, distal humerus, 2 cortical bone fragments.
Dentition:

```
no maxilla
-----------------
-------- -////xxx
```

General pathology: ? fracture of one right rib shaft. Osteochondritis dissecans of proximal left second metacarpal. Osteophytosis of lumbar vertebrae. Porosity of right acromioclavicular joint. Biceps enthesopathy of right radius and triceps enthesopathy of right ulna.
Dental pathology: Ante-mortem tooth loss, severe periodontal disease.
Non-metric traits: Lambdoid ossicles, right mastoid foramen sutural, right acetabular crease.

Inhumation 3931 (Phase 3, L86)

Male, young/middle adult, stature 170.7cm ± 2.99cm (femur + tibia).
Supine, extended.
Preservation: Excellent. All bones present apart from a few hand bones.
Dentition:

```
            c
87654321 12345678
-----------------
87654321 12345678
```

General pathology: Severe trauma to right wrist with flattening and squashing of lunate bone. Periostitis of both tibiae, right maxillary sinusitis. Bilateral cribra orbitalia (Stuart-Macadam grade 2 right,

grade 4 left). Osteoarthritis of left hip. Osteophytosis of left first metatarsal head. Both tibiae are flattened antero-posteriorly ? cause. Schmorl's nodes.
Dental pathology: Calculus 32/32, caries 1/32, moderate periodontal disease. Extra cusp on buccal aspect of 2nd left molar.
Non-metric traits: Right ossicle at parietal notch, mastoid foramina extrasutural, right double anterior condylar canal, accessory supraorbital foramen, left plaque, hypotrochanteric fossae, double anterior calcaneal and talar facets, transverse foramina bipartite (C3 - C6).

Inhumation 3932 (Phase 3, L86)

Female, mature adult, no complete long bones.
Supine.
Preservation: Poor. Bones present: cranium, both clavicles, left scapula, most of both humeri, a few hand bones, a few vertebrae, parts of both humeri, right calcaneus.
Dentition:

```
         a
  - 7 - x 4 3 2 /   x x 3 x 5 6 - -
  ---------------------------------
  x x x x x 3 2 1   1 2 x x x x x x
         a
```

General pathology: Osteoarthritis of right acromioclavicular, atlanto-axial joint and cervical vertebrae, osteoporosis of lumbar spine.
Dental pathology: Calculus 11/11, abscesses, antemortem tooth loss, considerable periodontal disease.
Non-metric traits: Lambdoid ossicles, left parietal foramen, left ossicle at asterion, left auditory torus, mastoid foramina extrasutural, right double anterior condylar canal, hypotrochanteric fossae, right single anterior calcaneal facet.

Inhumation 3933 (Phase 3, L86)

Male, mature adult, stature 168.1cm ± 2.99cm (femur + tibia).
Decapitated, supine, extended.
Preservation: Good. All bones present apart from left clavicle and some hand and foot bones. Skull and ribs are fragmentary.
Additional bones: 1 metatarsal shaft
Dentition:

```
  np   c                        a np
  8 7 x 5 4 3 2 1   1 2 3 4 x   x 7 8
  -----------------------------------
  8 7 6 / 4 3 2 1   / 2 3 4 5 6 7 8
  npc ra  r
```

General pathology: Only one fragment each remains of 3rd and 4th cervical vertebrae. Septic arthritis of 1st left distal metatarsal. Thickening of left tibia perhaps indicative of haematoma formation. Periostitis of left tibia. Fractures of right fibula and ? right 2nd rib. Compression fracture of 4th sacral vertebra. Osteoarthritis of left hip and right 1st metatarsophalangeal joint. Degeneration of both rotator cuffs, osteophytosis of both humeral heads, spine and right glenoid. Schmorl's nodes. Bilateral maxillary sinusitis ? due to dental disease. Triceps enthesopathy of left ulna and biceps enthesopathy of left radius. Degeneration of facets for 1st ribs on manubrium.
Dental pathology: Ante-mortem tooth loss, calculus 10/23, caries 5/23, severe periodontal disease, abscesses, hypoplasia 2/23, non-eruption of all third molars.
Non-metric traits: Left parietal foramen, mastoid foramina extrasutural, mandibular tori, single anterior calcaneal and talar facets.

Inhumation 3934 (Phase 5, L90)

Male, young adult, stature 173.8cm - 3.99cm (femur + tibia).
Supine, extended.
Preservation: Fair. All bones present apart from vertebrae, of which only fragments remain. Ribs and pelvis fragmentary. Some hand and foot bones missing.
Additional bones: Right distal femur, 2 calcaneal fragments, right and left rib, right 1st metatarsal, left 1st mandibular molar, 4 metatarsal shaft fragments, 2 fibular shaft fragments, right talus.
Dentition:

```
  - 7 6 5 4 3 / /   / 2 3 4 5 6 7 8
  ---------------------------------
  8 7 6 5 4 3 / /   / 2 3 4 5 6 7 -
```

General pathology: Costoclavicular ligament enthesopathy on left clavicle, deltoid enthesopathy on right clavicle.
Non-metric traits: Lambdoid ossicles, left parietal foramen, left squatting facet, right medial talar facet, double anterior calcaneal and talar facets.

Inhumation 3935 (Phase 4, L88)

Female, young/middle adult, no complete long bones.
Supine, extended.
Preservation: Poor. Bones present: Parts of frontal and parietal bones, right temporal bone, teeth, right clavicle, both humeri (missing distal ends), 3 lumbar vertebral bodies, pelvic and sacral fragment, both femoral shafts, both tibial and fibular shafts (missing proximal ends) some foot bones.
Dentition:

```
  8 7 6 5 4 - 2 -   1 - -   - - - 7 8
  -----------------------------------
  8 7 - 5 4 3 2 -   - 2 3 4 5 6 7 8
```

Dental pathology: Calculus 5/21.
Non-metric traits: Left tibial squatting facet, double right anterior calcaneal and talar facets.

Inhumation 3936 (Phase 3, L86)

Male, young adult, stature 171.8cm ± 2.99cm (femur + tibia).
Supine, extended.
Preservation: Fair. Most bones present apart from cranium, right arm and scapula, clavicles, cervical and upper thoracic vertebrae.
General pathology: Amputation, ununited fracture or traumatic severance of distal half of first proximal hand phalanx. Spina bifida of 4th and 5th sacral vertebrae, enthesopathy of right os styloideum on third metacarpal. Schmorl's nodes.
Non-metric traits: Third trochanters, acetabular creases, left lateral talar extension, single anterior talar and calcaneal facets.

Inhumation 3937 (Phase 3, L86)

Male, young/middle adult, stature 170.7 ± 3.99 (femur + tibia).
Supine, extended.
Preservation: Fair. All bones present apart from skull, right scapula, humerus, sternum, some hand and foot bones.
Dentition: Four loose teeth.
General pathology: Fracture of left fibula. Osteochondritis dissecans of left distal femur. Schmorl's nodes.
Non-metric traits: Bilateral plaque, right 3rd trochanter, absent anterior calcaneal facets, peroneal tubercles.

Inhumation 3938 (Phase 3, L86)

Adult, middle adult, no complete long bones.
Decapitated, supine, extended.
Preservation: Very poor. Bones present: Mandible, axis and third cervical vertebrae, right hand, patellae, both tibiae and fibulae and most foot bones.
Additional bones: 1 talus.
Dentition:

```
          no maxilla
  ---------------------------------
  8 7 6 5 4 3 2 1   1 2 3 4 5 6 7 8
```

General pathology: Only a small fragment of the third cervical vertebra remains. The vertebral body has been transected diagonally probably post-mortem. Osteochondritis dissecans of first right metatarsal.
Dental pathology: Calculus 12/16, caries 1/16, moderate periodontal disease.
Non-metric traits: Bilateral vastus notches, bilateral double anterior calcaneal and talar articular surfaces.

Inhumation 3939 (Phase 3, L86)

Subadult, 4 - 6 years.
Supine, extended.
Preservation: Good. All bones present apart from manubrium, sternum, right ulna and most hand and foot bones. Skull is fragmentary and arm bones are incomplete.
Dentition:

```
u               u
6ed/// //cde6
-------------------------
6edcba xbcde6
u               u
```

General pathology: Periostitis on right temporal bone and right tibia.
Dental pathology: Ante-mortem tooth loss of left mandibular central incisor.

Inhumation 3940 (Phase 3, L86)

Female, young/middle adult, stature 155.9cm ± 3.55cm (femur + tibia).
Supine, extended.
Preservation: Good. All bones present apart from cranium, facial bones, sternum, a few hand and foot bones.
Dentition:

```
- - - - -3- - - - - - - -6 -8
--------------------------------
/7654321 12345678
           cc
```

General pathology: Periostitis of both tibiae, fibulae and right metatarsals. Spina bifida of 3rd - 5th sacral vertebrae, bilateral shortened naviculars. Osteophytosis of 2 left rib tubercles.
Dental pathology: Calculus 8/16; caries 2/16.
Non-metric traits: Bilateral plaque, hypotrochanteric fossae and squatting facets. Right os trigonum, single talar facets, absent anterior calcaneal facets.

Inhumation 3941 (Phase 5, L90)

Infant.
Late foetal/neonatal (41.4 weeks gestation ± 2 weeks).
Crouched.
Preservation: Good. Most bones present apart from tibiae, fibulae and foot bones.

Inhumation 3942 (Phase 3, L86)

? Male, mature adult, no complete long bones.
Supine, extended.
Preservation: Poor. Bones present: Mandible, both clavicles, part of left scapula, fragmentary humeri (missing proximal ends), both ulnae and radii (right ones missing distal ends), most hand bones, fragmentary ribs, some vertebrae, fragmentary pelvis, both femoral shafts and heads, both tibiae and fibulae (right ones without proximal ends), both feet.
Dentition:

```
no maxilla
--------------------------------
xxxxx/// ///x5xxx
             r
```

General pathology: Fractures of left tibia, left fibula and two right ribs. Osteoarthritis of left hip, thoracic spine and right acromioclavicular joint. Osteophytosis of right hip, right shoulder and right elbow. Schmorl's nodes. Adductor enthesopathies on right femur.
Dental pathology: Ante-mortem tooth loss, caries 1/1.
Non-metric traits: Single anterior calcaneal facets, left single talar facet, left peroneal tubercle.

Inhumation 3943 (Phase 3, L86)

Male, mature adult, no leg bones.
Supine.
Preservation: Poor. Bones present: Fragmentary cranium, both clavicles, scapulae, humeri, radii, ulnae and some hand bones, most ribs and vertebrae, pelvis, right patella.
Dentition:

```
87xxxxxx x///5-78
--------------------------------
xx654321 x2345xxx
```

General pathology: Osteoarthritis of cervical and thoracic spine, left wrist and left 1st metacarpo-phalangeal joint. Osteoarthritis of one right and one left costo-vertebral joint. Osteophytosis of both acetabula and spine. Schmorl's nodes. Enthesopathies of right patellar ligament, proximal hand phalanges, right rotator cuff and right ischial tuberosity.
Dental pathology: Ante-mortem tooth loss, calculus 13/13, considerable periodontal disease.
Non-metric traits: Lambdoid ossicles, metopic suture, left single zygomaticofacial foramen, circumflex sulci.

Inhumation 3944 (Phase 5, L90)

Male, young adult, no complete long bones.
Supine.
Preservation: Fair. All bones present apart from distal femora, distal tibiae, both fibulae, most hand and foot bones.
Additional bones: Right tibial shaft
Dentition:

```
87654321 12345678
--------------------------------
87654321 /2345678
```

General pathology: Spina bifida of 3rd - 5th sacral vertebrae, 6 lumbar vertebrae. Periostitis of one right rib. Costoclavicular ligament enthesopathies of both clavicles. Trauma to right foot (talo-navicular articulation). Schmorl's nodes.
Dental pathology: Calculus 25/31, hypoplasia 9/31.
Non-metric traits: Left parietal foramen, left double condylar facet, double zygomaticofacial foramina, bridging of supraorbital notches, hypotrochanteric fossae, right single anterior talar and absent calcaneal facets, left double atlas facet.

Inhumation 3945 (Phase 3, L86)

Male, middle adult, no leg bones
Supine, extended
Preservation: Poor. Bones present: Part of left parietal and occipital bones, part of left scapula, both humeri (missing proximal ends), both ulnae and radii (right ones missing distal ends), left hand bones, fragmentary ribs, most thoracic and lumbar vertebrae, most of pelvis, both femora (missing distal ends).
General pathology: Four-segmented sacrum fused to first coccygeal vertebra with spina bifida occulta of S1, S3 and S4. Partial spondylolysis of fifth lumbar vertebra (unfused on left side of neural arch). Osteophytosis of lower thoracic and lumbar spine. Osteophytosis of both femoral heads.
Non-metric traits: Lambdoid ossicles, bilateral plaque, exostoses in trochlear fossae, septal apertures.

Inhumation 3946 (Phase 5, L90)

Female, mature adult, stature 157.7cm ± 3.55cm (femur + tibia).
Supine, extended.
Preservation: Good. Most bones present apart from cervical vertebrae, sternum and manubrium, some hand and foot bones. Ribs and remaining vertebrae are eroded.
Additional bones: Fibular shaft, 3 fibula fragments, infant femoral shaft, right 2nd metacarpal, right 2nd and 5th metatarsals, 2 cortical bone fragments.
Dentition:

```
np              ac np
87654321 12345678
--------------------------------
87654321 x2345678
                  np
```

General pathology: Spina bifida occulta of first sacral vertebra, fracture of left distal fibula and right 12th rib, depressed fracture of right frontal bone, periostitis of both tibiae, osteophytosis of right femoral head, osteochondritis dissecans of left distal femur.

Enthesopathies of right rotator cuff and costotransverse ligament on two right and two left ribs.
Dental pathology: Calculus 17/28, considerable periodontal disease, caries 1/28, abscess, rotation and crowding of left mandibular lateral incisor, non-eruption of 3rd molars.
Non-metric traits: Right ossicle at asterion, right mastoid foramen extrasutural, right zygomaticofacial foramen, tibial squatting facets, lateral talar extensions, single anterior talar and calcaneal facets, peroneal tubercles.

Inhumation 3947 (Phase 3, L86)

? Female, mature adult, no complete long bones.
Supine, extended.
Preservation: Poor. Bones present: fragmentary skull without facial bones, medial clavicles, part of left scapula, right distal humerus, left humerus, right radius and ulna, left proximal radius and ulna, some hand bones, sternum, fragmentary ribs, vertebrae and pelvis, right proximal femur, left femur, tibia and fibula (the last two missing proximal ends), some foot bones.
Dentition: Only one mandibular molar remains.
General pathology: Osteoarthritis of some cervical and thoracic vertebrae. Osteophytosis of both distal ulnae, 2 left and 3 right rib tubercles, spine, left acetabulum and left proximal femur. Schmorl's nodes. Enthesopathy of left distal tibio-fibular ligament and soleal line on left tibia.
Dental pathology: Considerable periodontal disease.
Non-metric traits: Lambdoid ossicles, right plaque, acetabular creases, foramen in xiphoid process, left peroneal tubercle.

Inhumation 3948 (Phase 4, L73)

Male, mature adult, no complete long bones.
Supine, flexed.
Preservation: Fair. Much fragmentation, particularly of long bones. Bones present: cranium (without facial bones), left mandible, both clavicles, parts of scapulae, both humeri, left radius and ulna, right proximal radius and ulna, most hand bones, vertebrae, pelvic bones, both proximal femora, distal tibiae and fibulae, a few foot bones.
Dentition:

```
  c
--65---- -- -- ----
-------------------
---- ---- -234xxx/
```

General pathology: Ankylosis of axis and 3rd cervical vertebral joint and one right interphalangeal joint. Erosive lesion of 2nd metacarpophalangeal joint in left hand and of left talus. Osteoarthritis of right acromioclavicular joint. Fracture of left distal fibula. Periostitis of both distal tibiae. Left os styloideum. Enthesopathies of right rotator cuff and deltoid insertion on right acromion. Osteophytosis of four right and four left rib tubercles and spine. Schmorl's nodes. Porosity of both medial clavicles.
Dental pathology: Calculus 5/5, caries 1/5, considerable periodontal disease, antemortem tooth loss, hypercementosis of maxillary molar root.

Inhumation 3949 (Phase 3, L86)

Female, mature adult, no complete long bones.
Supine, extended.
Preservation: Very poor. Bones present: Part of right pelvis and femur, a few vertebrae, 1st sacral vertebra, scapulae, left clavicle and a few foot bones.
General pathology: Osteophytosis of left glenoid cavity, lumbar vertebrae and right acetabulum. Possible spondylolisthesis causing erosion of vertebral end plates of lumbo-sacral articulation.

Inhumation 3950 (Phase 4, L88)

Subadult, 14 - 16 years.
Prone, extended.
Preservation: Excellent. All bones present apart from a very few hand and foot bones. Some fragmentation of cranium.
Additional bones: 10 fragments of infant cranium (late foetal/neonatal).

Dentition:

```
u
8765dc21 ------7-
-----------------
87654c21 12c45678
u c             u
```

General pathology: Probable spina bifida occulta (confused by PM damage to sacral vertebrae. Periostitis of right tibia. Right cribra orbitalia (grade 2).
Dental pathology: Calculus 19/22, caries 1/22, delayed eruption of permanent dentition.
Impacted maxillary canine.

Inhumation 3951 (Phase 4, L88)

Subadult, 5 - 7 years
Decapitated, supine, slightly turned towards right-hand side
Preservation: Good. All bones present apart from manubrium, sternum, right pubis and some hand and foot bones.
Dentition:

```
uu           u
76edcba abcde6/
---------------
76edcba abcde67
uu           uu
```

General pathology: One cervical vertebral body is transected diagonally from right to left postmortem.
Dental pathology: Slight calculus 4/20.

Inhumation 3952 (Phase 4, L88)

Male, mature adult, stature 167.8cm ± 3.37cm (tibia).
Supine, legs slightly flexed.
Preservation: Good. All bones present apart from most of cranium (crushed by machine), sternum, atlas and axis vertebrae, left distal femur and patella, some hand and foot bones. Fragmentary pelvis.
Dentition:

```
no maxilla
-----------------
x/////// ///456//
           c
```

General pathology: Hypertrophic osteoarthritis of both hips, osteoarthritis of right elbow, right wrist, right acromioclavicular joint, cervical spine and head of 12th rib. Osteophytosis of both shoulders, spine and left elbow. Fusion of 4th and 5th cervical vertebrae, spinal osteophytosis with some crushing of T11 and T12. Schmorl's nodes. Porosity of both sternoclavicular joints. Partial sacralization of 6th lumbar vertebra with torsion and osteoarthritis of right apophyseal joint. Left os acromiale. Left maxillary sinusitis.
Dental pathology: Calculus 3/3, caries 1/3, considerable periodontal disease, ante-mortem tooth loss.
Non-metric traits: Mandibular tori, multiple right zygomaticofacial foramina, accessory supraorbital foramen, bridging of left suprascapular notch, circumflex sulci, single anterior calcaneal and talar facts, peroneal tubercles.

Inhumation 3953 (Phase 4, L73)

Male, young adult, no complete long bones.
Flexed, on right side.
Preservation: Fair. Most bones present apart from left mandible, manubrium, most of sternum, most right hand bones, cervical vertebrae, right patella, some foot bones. Cranium and ribs fragmentary.
Dentition:

```
no maxilla
-----------------
-6//32/ ///-----
```

General pathology: Periostitis on ribs (suggestive of chronic chest infection), periostitis of right distal radius, both femora, tibiae and fibulae, left foot bones, right calcaneus and 1st metatarsal. Generalized process suggestive of pulmonary hypertrophic

osteoarthropathy (Manchester, pers comm). Enthesopathies of pectoralis major on both clavicles and humeri, pronator quadratus on right ulna.
Dental pathology: Calculus 3/3, hypoplasia 1/3.
Non-metric traits: Right mastoid foramen extrasutural, right double anterior condylar canal, hypotrochanteric fossae, third trochanters, double anterior talar and calcaneal facets, right os trigonum.

Inhumation 3954 (Phase 4, L88)

? Female, adult, no complete long bones.
Supine.
Preservation: Very poor. Bones present: Both tibiae and fibulae (missing proximal ends), both feet (missing most phalanges).
General pathology: Achilles tendon enthesopathies on calcanei.
Non-metric traits: Tibial squatting facets, right lateral talar extension, single anterior calcaneal and talar facets, right peroneal tubercle.

Inhumation 3955 (Phase 3, L86)

Indeterminate, adult, no complete long bones.
Disturbed burial.
Preservation: Very poor. Only lower leg and foot bones remain. Bones present: right tibia (missing proximal end), right fibular shaft, left fibula (missing proximal end), most right foot bones, left metatarsals and most phalanges.
Additional bones: 2 hand phalanges.
General pathology: Osteoarthritis of 1st right metatarso-phalangeal joint.
Non-metric traits: Right peroneal tubercle, right double anterior talar and calcaneal facets.

Inhumation 3956 (Phase 4, L88)

Male, middle adult, stature 181.9cm ± 3.37 (tibia).
Supine, extended.
Preservation: Good. All bones present apart from a few hand foot bones. Skull and ribs slightly fragmented.
Dentition:

```
c    ar r          r r
x x x x 4 3 2 1  1 2 3 4 5 x - -
--------------------------------
8 7 6 5 4 3 2 1  1 2 3 4 5 x 7 8
c c                c
```

General pathology: Sacralization of 6th lumbar vertebra with fusion. Fracture of one right rib. Osteoarthritis of both acromioclavicular joints. Shoveller's fracture of 1st thoracic vertebra. Spinal osteophytosis, Schmorl's nodes. Medio-lateral bowing of both tibiae with eversion of proximal ends. Fibulae are also bowed. Periostitis of both tibiae and right fibula. Rib periostitis on 4 right ribs. Achilles tendon enthesopathies of both calcanei, biceps enthesopathies of both radii and deltoid enthesopathies on both clavicles.
Dental pathology: Calculus 10/24, hypoplasia 2/24, caries 8/24, abscess, considerable periodontal disease.
Non-metric traits: Parietal foramina, left mastoid foramen extrasutural, double right and triple left zygomaticofacial foramina, right exostosis in trochlear fossa, left tibial squatting facet, left medial talar facet, single anterior calcaneal and talar facets, right peroneal tubercle, transverse foramen bipartite (C4 and C5).

Inhumation 3957 (Phase 4, L88)

Male, middle adult, stature 176cm - 2.99cm (femur + tibia).
Decapitated, supine, extended.
Preservation: Good. All bones present apart from left patella, left tibia and fibula, left foot and some right foot bones.
Dentition:

```
      r a r   a a
x x x x / 3 2 1  / / / x x x x x
--------------------------------
8 7 6 x x / x x  x / / / x x 7 x
c c c                 a a
```

General pathology: Perimortal transection of upper body and articular facets of 6th cervical vertebrae. 5th cervical vertebra also shows cut marks on inferior aspect of vertebral body. Shoveller's fracture of 7th cervical vertebra. Osteoarthritis of left wrist and several joints in left hand. Osteoarthritis of left acromioclavicular joint. Osteophytosis of both humeral heads, right proximal ulna, spine, 6 right and 5 left rib tubercles. Schmorl's nodes. Enthesopathies of costoclavicular ligaments on both clavicles. Unfused atlas vertebra. Fusion of manubrio-sternal joint.
Dental pathology: Calculus 2/7, caries 5/7, ante-mortem tooth loss, abscesses, considerable periodontal disease.
Non-metric traits: Right mastoid foramen extrasutural, double right zygomaticofacial foramen, bilateral bridging of supraorbital notch, bilateral plaque, hypotrochanteric fossae, circumflex sulci, left vastus notch, left double anterior talar facet, double atlas facets.

Inhumation 3958 (Phase 4, L88)

? Female, mature adult, stature 160.1cm ± 3.55cm (femur + tibia).
Supine, extended.
Preservation: Good. All bones present apart from sternum, manubrium, a few hand and most foot bones. Cranium slightly fragmented.
Dentition:

```
         a
x x x x x x x x  x x x x x x x x
--------------------------------
x x x 5 4 / / /  x / 3 4 x x x x
                 c
```

General pathology: Osteoarthritis of both acromioclavicular joints, atlanto-axial joint, cervical vertebrae and one lower thoracic apophyseal joint. Osteophytosis of five right and one left rib tubercles, right distal ulna, right acetabulum and spine. Fracture of left distal fibula, partial sacralization of 5th lumbar vertebra, periostitis of both tibiae. Left cribra orbitalia (grade 1). Enthesopathies of teres major on left humerus, interosseous ligaments on both ilia and biceps insertion on left radial tuberosity.
Dental pathology: Calculus 1/4, caries 1/4, abscess, considerable periodontal disease.
Non-metric traits: Parietal foramina, left auditory torus, right double anterior condylar canal, left zygomaticofacial foramen, left bridging of supraorbital notch, exostoses in trochlear fossae, left tibial squatting facets, right single anterior calcaneal facet.

Inhumation 3959 (Phase 4, L88)

Male, middle adult, stature 168.3cm ± 2.99cm (femur + tibia).
Supine, extended.
Preservation: Good. Almost all bones present, apart from some hand and foot bones. Slight fragmentation of cranium.

Additional bones: Small hand bones
Dentition:

```
8 7 6 5 4 3 / 1  1 2 3 4 5 6 7 8
--------------------------------
8 7 6 5 4 3 2 1  1 2 3 4 5 6 7 8
```

General pathology: Osteoarthritis of right shoulder with rotator cuff trauma. Osteophytosis of three right rib tubercles, 11th right rib head and left 11th and 12th rib heads and spine. Schmorl's nodes. Porosity of both acetabula with enthesopathies of capsular ligaments. Spina bifida of 4th and 5th sacral vertebrae.
Dental pathology: Calculus 32/32. Hypoplasia 2/32. Crowding of 1st left mandibular premolar.
Non-metric traits: Parietal foramina, mastoid foramina extrasutural, double right anterior condylar canal, palatine tori, single right and double left zygomaticofacial foramina, right bridging of supraorbital notch and accessory supraorbital foramen. Right plaque, tibial squatting facets, circumflex sulci, lateral talar extensions, single anterior talar facets, absent anterior calcaneal facets.

Inhumation 3960 (Phase 4, L88)

Female, middle adult, 154.7cm ± 3.55cm (femur + tibia).
Prone, extended.
Preservation: Poor. Most bones present apart from right hand, pelvis and right leg.
Additional bones: 3rd left metatarsal
Dentition:

```
  r                     a c   c a
8 7 x x / 3 2 1   1 2 / x 5 x 7 8
---------------------------------
x x x 5 4 3 2 /   / 2 3 4 5 x x 8
                            c
```

General pathology: Fracture of left ulna, osteophytosis of right distal humerus, right proximal ulna, right proximal radius, two right and two left rib tubercles. Enthesopathy of right iliac crest. Spinal osteophytosis. Schmorl's nodes.
Dental pathology: Calculus 7/19, hypoplasia 2/19, caries 5/19, abscesses, antemortem tooth loss, considerable periodontal disease.
Non-metric traits: Lambdoid ossicles, palatine tori, right mandibular torus, double zygomaticofacial foramina, bridging of supraorbital notch, right tibial squatting facets, right circumflex sulcus, right lateral talar extension, single anterior talar and calcaneal facets.

Inhumation 3961 (Phase 3, L86)

Male, young adult, stature 167.3cm ± 2.99cm (femur + tibia).
Prone, extended.
Preservation: Excellent. All bones present apart from scapular blades, patellae, a few hand and foot bones.
Dentition:

```
8 7 6 5 4 x 2 1   1 2 x 4 5 6 7 8
---------------------------------
8 7 6 5 4 3 2 1   1 2 3 4 5 6 7 8
```

General pathology: Bilateral os acromiale. Trauma to left talus. Partial lumbarization of first sacral vertebra with slight right torsion. Osteophytosis of right calcaneal and navicular articular surfaces and of left calcaneal articulations. Schmorl's nodes.
Dental pathology: Calculus 18/30, ante-mortem tooth loss.
Non-metric traits: Parietal foramina, right epipteric bone, left mastoid foramen extrasutural, right bridging of supraorbital notch, hypotrochanteric fossae, double right anterior calcaneal and both inferior talar articular surfaces, absent left anterior calcaneal facet, right peroneal tubercle, transverse foramina bipartite (C6).

Inhumation 3962 (Phase 4, L88)

Female, mature adult, stature 158.35cm ± 3.57cm (fibula).
Prone, flexed.
Preservation: Good. All bones present apart from a few hand and foot bones and both patellae.
Dentition:

```
        a c       c   c     c
x x x x / 3 2 1   1 2 3 x 5 6 - -
---------------------------------
x x x 5 4 3 x x   x x 3 x x x x x
```

General pathology: Osteoarthritis of right hip, right acromioclavicular joint, both wrists, many costo-vertebral joints, cervical and lumbar apophyseal joints. Two button osteomata. Osteophytosis of joints of left foot, spine and left shoulder. Enthesopathies of rotator cuff insertions on both humeral heads and deltoid insertion on right clavicle.
Dental pathology: Ante-mortem tooth loss, calculus 5/10, caries 4/10, considerable periodontal disease.
Non-metric traits: Lambdoid ossicles, right ossicle at asterion, double zygomatico-facial foramina, left bridging of supraorbital notch, hypotrochanteric fossae, left exostosis in trochlear fossa. Left tibial squatting facets, left acetabular crease, single anterior talar and calcaneal facets. Right peroneal tubercle. Transverse foramina bipartite (C4-C6).

Inhumation 3963 (Phase 4, L88)

Male, young adult, no complete leg bones.
Supine, probably on right side.
Preservation: Poor. Left side of body missing. Bones present: Cranium and mandible, part of sternum, right clavicle, radius, ulna and most hand bones, cervical vertebrae, both innominates and femur, both fibulae, two right foot bones.
Additional bones: Right humerus, radius and ulna.

Dentition:

```
8 7 6 5 4 3 2 1   1 2 3 4 5 6 7 8
---------------------------------
8 7 6 5 4 3 / 1   1 2 3 4 5 6 7 8
```

General pathology: Premature fusion of right squamous temporal to parietal bone, possibly resulting from blow above external auditory meatus which has caused a depression in the bone. Enthesopathies of triceps on right ulna and costoclavicular ligament on right clavicle. Defect in right mandibular condyle.
Dental pathology: Calculus: 14/31, severe hypoplasia 8/31.
Non-metric traits: Lambdoid ossicles, mastoid foramina absent, double zygomaticofacial foramina, right hypotrochanteric fossa, transverse foramina bipartite (C4 and C6).

Inhumation 3964 (Phase 3, L86)

Male, mature adult, stature 168.1cm ± 3.37cm (tibia).
Supine, extended.
Preservation: Excellent. All bones present apart from patellae. Bone condition good. Complete cranium.
Dentition:

```
      r           a            ?np
- - x 5 4 3 2 1   1 x 3 4 5 6 7 8
---------------------------------
8 x 6 5 4 3 2 1   1 2 3 4 5 6 x 8
np  c       a           c   c   np
```

General pathology: Osteoarthritis of thoracic and lumbar spine and both acromioclavicular joints. Crush injury to second left hand proximal hand phalanx. Fracture of 2nd right rib. Cribra orbitalia of left orbit. Osteophytosis of four right and three left rib tubercles, spine and both femoral heads. Schmorl's nodes. Enthesopathies of biceps on both radii, Achilles tendon on both calcanei and right tibial collateral ligament. Partial subluxation of left hip.
Dental pathology: Calculus 21/23, considerable periodontal disease, caries 5/23, abscess, antemortem tooth loss.
Non-metric traits: Mastoid foramina extrasutural, double zygomaticofacial foramina, hypotrochanteric fossae, tibial squatting facets, lateral talar extensions, double anterior talar and calcaneal facets, transverse foramina bipartite (C4 and C5).

Inhumation 3965 (Phase 5, L90)

Female, mature adult, stature 151.3cm ± 6cm.
Supine, extended.
Preservation: Good. All bones present apart from sternum, scapular blades, part of pelvis, right distal femur, patellae, a few hand and foot bones. Ribs and skull are fragmentary.
Dentition:

```
                              a a
- - 6 5 4 3 2 1   1 2 3 4 5 6 x x
---------------------------------
8 x x 5 4 3 2 1   1 2 3 / 5 6 7 8
?np                            ?np
```

General pathology: Sacralization of 6th lumbar vertebra or lumbarization of first sacral vertebra (incomplete sacrum). Destruction of left radio-humeral joint; osteoarthritis of right acromioclavicular joint, of cervical spine, of three left and two right distal interphalangeal joints, of left wrist, of five right and five left rib tubercles and right 12th rib head articulation. Destruction of posterior part of left maxilla by infection probably caused by dental abscess resulting in maxillary sinusitis and thinning of floor of antrum. Right maxillary sinusitis also probably related to dental disease. Generalized osteoarthritis and spinal osteophytosis.

Dental pathology: Calculus 20/23, ante-mortem tooth loss, large abscess, considerable periodontal disease, severe wear on all teeth.
Non-metric traits: Double anterior condylar canals, left zygomaticofacial foramen, exostoses in trochlear fossa, left third trochanter, left third trochanter, left tibial squatting facets, single anterior calcaneal and talar facets, transverse foramina bipartite (C5 - C7).

Inhumation 3966 (Phase 5, L90)

? Female, mature adult, stature 167.2cm ± 3.55cm (femur + tibia).
Prone, extended.
Preservation: Fair. Most bones present apart from part of sternum, some hand and foot bones. Much fragmentation of cranium, ribs and vertebrae.
Additional bones: Left femur and tibia, right fibula, some foot bones.
Dentition:

```
                       c r
- - 6 5 4 3 2 1  1 2 3 4 5 6 7 x
---------------------------------
8 7 6 5 4 3 2 1  1 2 3 4 5 6 7 8
r
```

General pathology: Os acromiale of right scapula, pseudarthrosis between calcaneus and navicular. Fracture of right fibula and stress fracture in right 3rd metatarsal. Left maxillary sinusitis. Enthesopathies of both rotator cuff insertions on proximal femora, both patellar ligaments, Achilles tendons on both calcanei, soleal lines on both tibiae and pronator quadratus on both ulnae. Osteophytes of one right and one left rib articulation, both acetabula, both femoral heads and spine. Schmorl's nodes.
Dental pathology: Calculus 27/29, caries 3/29, considerable periodontal disease.
Non-metric traits: Parietal foramina, left mandibular torus, hypotrochanteric fossae, exostosis in right trochlear fossa, right third trochanter, tibial squatting facets. Right circumflex sulcus, lateral talar extensions, single anterior talar and absent anterior calcaneal facets.

Inhumation 3967 (Phase 4, L88)

Male, young/middle adult, stature 177.56cm ± 2.99cm (femur + tibia)
Prone, extended.
Preservation: Excellent. All bones present apart from right radius, ulna, a few hand and foot bones.
Dentition:

```
8 7 6 5 4 3 x 1  1 x 3 4 5 6 7 /
---------------------------------
8 7 6 5 4 3 2 1  1 2 3 4 x 6 7 /
```

General pathology: Depressed skull fracture on left frontal bone. Periostitis of left tibia. Enthesopathies of both patellar ligaments, soleal lines on tibiae, distal tibio-fibular ligaments and Achilles tendon on right calcaneus. Osteophytosis of both acetabula, both femoral heads, right foot bones, two left and three right rib tubercles. Schmorl's nodes.
Dental pathology: Congenital absence of maxillary lateral incisors, rotation of left maxillary canine.
Non-metric traits: Right mastoid foramen extrasutural, hypotrochanteric fossae, third trochanters, right vastus notch, double anterior talar and right calcaneal facets. Right lateral atlas bridging.

Inhumation 3968 (Phase 4, L88)

Subadult, 14 - 16 years.
Supine, on right side.
Preservation: Excellent. All bones present apart from sternum, some epiphyses and a few hand and foot bones.
Dentition:

```
                         u
/ 7 6 5 4 3 2 1  / 2 3 4 5 6 7 8
---------------------------------
8 7 6 5 4 3 2 1  1 2 3 4 5 6 7 /
u   c
```

Dental pathology: Calculus 22/26, caries 1/26, moderate hypoplasia 9/26.

Inhumation 3969 (Phase 4, L88)

Subadult, female, 14 - 16 years.
Supine, flexed (left knee above right knee).
Preservation: Excellent. All bones present apart from manubrium, right patella and a few hand and foot bones.

Dentition

```
u                              u
8 7 6 5 / / / /  1 2 3 4 5 6 / 8
---------------------------------
8 7 6 5 4 3 2 1  1 2 3 4 5 6 7 8
u                              u
```

General pathology: Disuse atrophy of right arm possibly due to polio. Bilateral cribra orbitalia. Enthesopathy of pectoralis major on right humerus. 4-segmented sacrum.

Inhumation 3970 (Phase 3, L86)

Male, young adult, no complete leg bones.
Supine, flexed.
Preservation: Poor. All bones present apart from left femur, left patella, both tibiae and fibulae and right foot. Skull, ribs and pelvis fragmentary, as are sternum, manubrium and scapulae.
Dentition:

```
8 7 6 5 4 3 2 1  1 2 3 / 5 6 7 8
---------------------------------
8 7 6 5 4 3 2 1  1 2 3 4 5 6 7 8
```

General pathology: Bilateral cribra orbitalia (Stuart-Macadam grade 3/4). Cortical defect in teres major insertion on both humeri. Schmorl's nodes.
Dental pathology: Calculus 22/31.
Non-metric traits: Lambdoid ossicles, left parietal foramen, ossicle at right parietal notch, right posterior condylar canal open, triple left and double right zygomaticofacial foramina, right Allen's fossa, right hypotrochanteric fossa, left talar extension, single left anterior talar and calcaneal facets.

Inhumation 3971 (Phase 3, L86)

Male, mature adult, no complete long bones
Supine, extended
Preservation: Poor. Bones present: Posterior cranium, right mandible, both humeral, radial and ulnar shafts, some hand bones, fragmentary pelvis and a few lumbar vertebrae, both femora, tibial and fibular shafts, right calcaneus and left talus.
Dentition: Only 2 teeth remain.
General pathology: Osteoarthritis of right hip and joint between 4th and 5th lumbar vertebrae. Osteophytosis of left acetabulum, femoral head and lumbar vertebrae. Partial sacralization of 5th lumbar vertebra (without fusion). Enthesopathies of patellar ligament on right tibial tuberosity, quadriceps tendons on right ilium and ischial tuberosity, Achilles tendons on right calcaneus, triceps on right ulna and biceps on right radius.
Non-metric traits: Exostosis in left trochlear fossa, left double anterior talar and right calcaneal facets.

Inhumation 3972 (Phase 3, L86)

Female, mature adult, stature 161.0cm ± 3.66cm (tibia).
Decapitated, supine, extended.
Preservation: Poor. Bones present: cranium and mandible, both humeral, right radial and ulnar shafts, a few cervical vertebrae, both femora (missing proximal ends), patellae, tibiae and fibulae, most foot bones.
Dentition:

```
              ar
x x x x 4 3 2 1  / 2 3 4 x - - -
---------------------------------
x 7 6 5 4 3 / /  1 2 / 4 5 / x x
r c
```

General pathology: Cut marks on inferior aspect of third cervical vertebra, probably post-mortem. Right Achilles tendon enthesopathy

Porosity of left mandibular fossa.
Dental pathology: Calculus 14/16, caries 3/16, considerable periodontal disease.
Non-metric traits: Mastoid foramina extrasutural, left double anterior condylar canal, left double zygomaticofacial foramen, left double anterior talar and calcaneal facets.

Inhumation 3973 (Phase 3, L86)

Subadult, <5 years.
Disturbed.
Preservation: Very poor. Bones present: a few ribs, most of left ulna, 2 long bone fragments.

Inhumation 3974 (Phase 3, L86)

Male, young adult, stature 166.4cm ± 3.99cm (femur + tibia).
Supine, extended.
Preservation: Excellent. All bones present apart from a few hand and foot bones and both patellae.
Dentition:

```
8765/321 12345678
-----------------
876x/321 1234/678
```

General pathology: Partial sacralization of 5th lumbar vertebra without fusion. Periostitis of right tibia and left fibula. Cortical defects at insertions of both costoclavicular ligaments. Schmorl's nodes.
Dental pathology: Calculus 19/28, hypoplasia 4/28. Retained left mandibular second deciduous incisor. Ante-mortem tooth loss. Rotation of left maxillary first premolar.
Non-metric traits: Lambdoid ossicles, bilateral parietal foramina, bilateral bridging of supraorbital notch, single anterior calcaneal and talar facets, transverse foramen bipartite (C6).

Inhumation 3975 (Phase 5, L90)

Female, young/middle adult, stature 161.5cm - 3.55cm.
Supine, extended.
Preservation: Fair. Bones present: Part of mandible and occipital bone, both clavicles, part of right scapule, both humeri (left without ends), right radius and ulna, left radial and ulnar shaft fragments, some hand bones, a few ribs, fragmentary vertebrae, part of pelvis, both femora, tibiae, fibulae and patellae, most foot bones. Bones have badly eroded surfaces.
Dentition:

```
ccr
87654321 12345---
-----------------
87654321 123456--
 cc        c c
```

General pathology: Periostitis affecting both tibiae and fibulae.
Dental pathology: Caries 7/27.
Non-metric traits: Bilateral plaque, acetabular notches, single anterior calcaneal and talar facets.

Inhumation 3976 (Phase 3, L86)

Male, young/middle adult, stature: 158.49cm ± 2.99cm (femur + tibia).
Supine, flexed.
Preservation: Good. All bones present apart from left side of cranium and mandible, most of right foot, some hand and foot bones.
Dentition:

```
xxx/ //// --------
------------------
87x5///- --------
```

General pathology: First sternal vertebra is fused to manubrium. Partial spondylolysis of 5th lumbar vertebra. Periostitis of right ilium, both tibiae and fibulae. Trauma to left foot, particularly the talo-navicular joint. Possible stress fracture of 2nd left metatarsal. Enthesopathies of both Achilles tendons. Osteophytosis of right femoral head and lumbar vertebrae.
Dental pathology: Ante-mortem tooth loss, calculus 3/3, considerable periodontal disease.

Non-metric traits: Lambdoid ossicles, right parietal foramen, metopic suture, right posterior condylar canal open, right triple zygomaticofacial foramen, right circumflex sulcus, single anterior talar and absent anterior calcaneal facets.

Inhumation 3977 (Phase 5, L90)

Male, mature adult, stature 179.8cm ± 2.99cm (femur + tibia).
Decapitated, supine, extended.
Preservation: Excellent. All bones present apart from a few hand and foot bones. Cranium fragmentary.
Dentition:

```
             r
xxxx432/ 1234xxxx
-----------------
87654321 123/5678
np           c  np
```

General pathology: Perimortal transection of 7th cervical vertebra across superior aspect of neural arch with removal of superior apophyseal facets and posterior part of upper vertebral body. There is also a diagonal cut which has removed the anterior half of the lower vertebral body. There are also two cut marks on the superior aspect of the right clavicle with a third, much deeper one near the distal end. These could have been made at the same time as the decapitation since there is no evidence of healing. Cut probably carried out from left to right. Fractures of both distal fibulae, two right mid-thoracic (??7th and 8th) and 3rd, 4th and 5th left ribs. Bilateral maxillary sinusitis (more severe on right). Osteoarthritis of both acromioclavicular, left talocalcaneal and both 10th costo-vertebral joints. Osteophytosis of right acetabulum, left femoral head, proximal hand phalanges and spine. Schmorl's nodes. Spina bifida occulta of 1st, 2nd, 4th and 5th sacral vertebrae. Enthesopathies of rotator cuffs on both humeral heads (subscapularis), patellar ligaments and Achilles tendon on right calcaneus. Ellipsoid exostosis on left tibia (? cause).
Dental pathology: Calculus 14/20, caries 1/20, ante-mortem tooth loss, non-eruption of mandibular third molars, considerable periodontal disease.
Non-metric traits: Right bridging of supraorbital notch, bilateral plaque, hypotrochanteric fossae, exostoses in trochlear fossae, bilateral vastus notch, single anterior talar and absent calcaneal facets.

Inhumation 3978 (Phase 3, L86)

Male, middle adult, no complete leg bones.
Supine.
Preservation: Fair. Most bones present but many fragmented including skull, ribs, pelvis and left tibia. Most foot bones, manubrium, a few vertebrae and hand bones are missing. Most long bone ends are destroyed.
Dentition:

```
             cc
--65432- /23456/8
-----------------
8765432/ 1/345678
ra           rc
```

General pathology: Button osteoma on parietal bone. Spina bifida of S3, S4 and S5. Epiphyses on lateral clavicles unfused. Right maxillary sinusitis. Osteophytosis of left hip, right distal first metacarpal, left scaphoid and spine.
Dental pathology: Calculus 18/25, caries 5/25, abscess, moderate periodontal disease.
Non-metric traits: Right mastoid foramen extrasutural, hypotrochanteric fossae, right Poirier's facet, right supracondyloid process, left double anterior talar facet, right posterior atlas bridge.

Inhumation 3979 (Phase 3, L86)

Male, young/middle adult, stature 171.32cm ± 2.99cm (femur + tibia).
Supine, extended.
Preservation: Poor. Bones present: Cranium, mandible, right clavicle and scapula, right humerus and ulna, left humeral, radial and ulnar shafts, right radial shaft, both femora, patellae, tibiae, fibulae and most foot bones.
Dentition:

8 7 6 5 4 3 2 1 1 2 3 4 5 6 7 8

----

8 7 6 5 / / 2 / / / 3 / / 6 7 8

General pathology: Os acromiale of right scapula, possible osteoma on right femur, enthesopathies of left tibial collateral ligament, both patellar ligaments, teres major on left humerus and medial head of gastrocnemius on left femur. Ossification of distal tibio-fibular ligment on left tibia. Right maxillary sinusitis.
Dental pathology: Calculus 22/25, moderate periodontal disease.
Non-metric traits: Lambdoid ossicles, right bridging of suprascapular notch, single anterior talar and calcaneal facets.

Inhumation 3980 (Phase 4, L88)

Female, young adult, stature 161.3cm ± 3.66cm (tibia).
Supine, extended.
Preservation: Fair. Most bones present apart from facial bones, manubrium, some ribs, most hand bones, both patellae, most foot bones.
Dentition:

ra
- - - - x 4 3 2 / - - - - - - - -

- - - - - - - - - - - 3 4 5 6 7 8
c c c

General pathology: Partial sacralization of 5th lumbar vertebra without fusion. Anomaly in development of facet joints between 10th and 11th thoracic vertebrae.
Dental pathology: Calculus 5/9, caries 4/9, abscess.
Non-metric traits: Right squatting facets, right septal aperture, right acetabular crease. Right double anterior talar and calcaneal facets. Transverse foramina bipartite (C5 - C7).

Inhumation 3981 (Phase 4, L88)

Female, mature adult, stature 177.2cm ± 4.24cm (radius).
On left side, slightly flexed.
Preservation: Good. All bones present apart from manubrium, right scapula blade, some hand bones, part of pelvis, left patella, left fibula and a few foot bones.
Dentition:

8 7 6 5 4 3 2 1 1 2 3 4 5 6 7 x

----

x 7 x 5 4 3 2 1 1 2 3 / x 6 7 8
a

General pathology: Bilateral maxillary sinusitis. Oro-antral fistula. Slight cribra orbitalia (Stuart-Macadam grade 2). 6-segmented sacrum. Osteophytosis of right hip, right knee, first left metacarpal, spine, one left and 2 right rib heads. Schmorl's nodes. Bilateral Achilles tendon and rotator cuff (subscapularis) of humeri enthesopathies.
Dental pathology: Calculus 23/27, ante-mortem tooth loss, considerable periodontal disease, root abscess.

Inhumation 3982 (Phase 4, L88)

Male, mature adult.
Prone, flexed.
Preservation: Good. All bones present apart from right scapula, most of sternum, some ribs, left patella, a few hand and foot bones.

Dentition:

np r r a r
8 7 x 5 4 3 / 1 / 2 3 x 5 x - -

----

8 7 x 5 4 3 2 1 1 2 3 4 5 x 7 8
?np c r r aca c u

General pathology: Fractures of both clavicles, left ulna, second and fifth left metacarpals. Crush injury to left trapezium with infection of first left metacarpal. Periostitis of both tibiae and fibulae. Right maxillary sinusitis. Ossification of extensor insertion on left distal humerus and both flexors and extensors on right distal humerus, Achilles tendon enthesopathy on right calcaneus, right patellar ligament enthesopathy. Osteophytosis of left knee, spine and both shoulders. Fusion of 3 pairs of thoracic vertebrae. Porosity of 2 right rib heads and osteophytes of 2 left rib heads. Osteoarthritis of both acromioclavicular joints.
Dental pathology: Calculus 12/20, caries 8/20, abscesses, antemortem tooth loss, impacted left and noneruption of right mandibular third molar.
Non-metric traits: Lambdoid ossicles, right parietal foramen, right ossicle at parietal notch, mastoid foramina absent, zygomaticofacial foramina, bridging of supraorbital notches, double anterior talar and calcaneal facets, peroneal tubercles.

Inhumation 3983 (Phase 4, L88)

Infant, late foetal/neonatal (39.7 weeks ± 2 weeks).
Supine.
Preservation: Fair. Bones present: Fragmentary cranium, left humerus, right radius and proximal ulna, left distal radius, right proximal femur, right tibia, part of both fibulae, some hand bones.

Inhumation 3984 (Phase 4, L88)

? Female, adult, stature 158.39cm ± 3.66cm (tibia).
Prone, extended.
Preservation: Poor. Bones present: Distal femora, both tibiae and fibulae, most foot bones.
General pathology: Osteoarthritis of right knee, osteophytosis of left distal femur and proximal tibia. Achilles tendon enthesopathy of right calcaneus. New bone formation on metatarsal shafts of both feet, periostitis of both tibiae and fibulae.
Non-metric traits: Tibial squatting facets, lateral talar extensions, single anterior talar and calcaneal facets, right posterior atlas bridging.

Inhumation 3985 (Phase 5, L90)

Male, mature adult, stature 168.7cm ± 3.27cm (femur).
Prone, extended.
Preservation: Fair. Bones present: Cranium and mandible, both clavicles and part of scapulae, both humeri (fragmentary proximal ends), left radius and ulna, right radius and ulna (missing proximal ends), most hand bones, fragmentary ribs, vertebrae and pelvis, both femora, patellae, fragmentary tibiae and fibulae.
Dentition:

c r
- x x x x 3 / 1 1 / 3 x 5 x x x

----

8 7 x 5 4 3 2 1 1 2 / / / x 7 /
ac c r r a c

General pathology: Osteoarthritis of right wrist, cervical and thoracic spines. Fracture of left 5th metacarpal. Enthesopathies of both Achilles tendons. Left maxillary sinusitis probably due to dental disease. Osteophytosis of right distal humerus, spine and right medial clavicle.
Dental pathology: Calculus 7/15, caries 8/15, abscesses, considerable periodontal disease, slight enamel hypoplasia.
Non-metric traits: Left parietal foramen, zygomatico facial foramina, hypotrochanteric fossae, transverse foramen bipartite (C6).

Inhumation 3986 (Phase 5, L90)

Male, young adult, stature 176.8cm ± 2.99cm (femur + tibia).
Supine, extended.
Preservation: Fair. All bones present apart from distal clavicles, right scapula blade, sternum, some ribs, most vertebrae, part of pelvis, patellae, right fibula, some hand and foot bones.
Dentition:

8 7 6 5 4 3 2 1 1 2 3 4 5 6 7 8

----

8 7 6 5 4 3 2 1 1 2 3 4 5 6 7 8

General pathology: Osteitis of distal left femur. Cortical defect in pectoralis insertion on right humerus and at insertions of both costoclavicular ligaments on clavicles.

Dental pathology: Calculus 6/32.
Non-metric traits: Double left anterior condylar canal, right hypotrochanteric fossa, acetabular notches, double right anterior calcaneal surface.

Inhumation 3987 (Phase 3, L86)

Female, middle adult, stature 154.7cm ± 3.55cm. (Femur + tibia).
Supine extended.
Preservation: Excellent. All bones present apart from a few hand and foot bones and first 3 cervical vertebrae.
Dentition:

```
?np  c       c
     8 7 x x 4 x / /   / 2 x x x - - -
     ---------------------------------
     x x x 5 4 3 2 1   1 2 3 4 x x x x
               c   c
```

General pathology: Osteoarthritis of second and third vertebral facet joints, enthesopathies of right Achilles tendon and left distal tibio-fibular ligament. Osteophytosis of proximal right ulna and two right rib tubercles.
Dental pathology: Calculus 2/13, caries 4/13, hypoplasia 2/13, considerable periodontal disease.
Non-metric traits: Lambdoid ossicles, right mastoid foramen extrasutural, bilateral double anterior calcaneal and talar facets, bilateral peroneal tubercles, right transverse foramen bipartite (C7).

Inhumation 3988 (Phase 3, L86)

Male, mature adult, stature 156.5cm ± 2.99cm (femur + tibia).
Supine, extended.
Preservation: Good. Most bones present apart from cranium, right humerus, radius (apart from distal end) and ulna, sternum, some vertebrae, a few hand and foot bones. Ribs are fragmentary.
General pathology: Diffuse idiopathic skeletal hyperostosis (DISH) indicated by fusion of 3 pairs of thoracic vertebrae and ossification of tendons and ligaments (enthesopathies) on both patellae (patellar ligament), both calcanei (Achilles tendons), pelvis (quadriceps tendons), both femora, tarsal bones of feet and proximal hand phalanges. Osteoarthritis of right acromioclavicular, left sternoclavicular joints, 11th and 12th costovertebral, left radio-ulnar joint, right 2nd and 3rd and left 1st, 2nd and 3rd metacarpo-phalangeal joints. Osteophytosis of both hips, 3 right rib heads and 3 tubercles. Periostitis of both tibiae. Spina bifida occulta of 4th and 5th sacral vertebrae.

Physical Anthropology

Minimum Number of Individuals;

A total of 87 inhumation burials were recognized archaeologically; Inh 3916 consisted of skeletal elements from Inh 3923. In addition, a substantial part of a second individual was found with burial 3966 and a number of long bones from the left side of a young adult were included with Inh 3954. There was an additional set of leg bones which had no context number and an extra right tibia and fibula with Inh 3959. A total of 11 subadults were identified, including part of an infant cranium in Inh 3950. In summary, it appears that there may have been as many as 92 individuals buried in the cemetery. Small numbers of skeletal elements were found in a few graves which did not belong to the primary incumbent. However, there was some inter-mingling of burials, particularly at the western end of the site and inevitably a few bones will have found their way into adjacent contexts. These are not considered to represent separate individuals.

Certain anatomical points on the skeleton such as the glabella (on the frontal bone) were counted to establish a minimum number of individuals. The most frequently represented elements were the right femoral head (76 examples) and the right acetabulum (also 76 examples). These areas of the skeleton often preserve well because of their relative density.

Preservation

The amount of information which can be gained from a human bone assemblage depends heavily upon the quality of preservation. Each burial was allocated to a category depending both on the percentage of skeletal elements remaining and upon the degree of fragmentation and surface erosion which had occurred. Almost half the burials fell into the excellent or good category (Table 8.17) and were more than 75% complete. However, only 9 male and 2 female crania were sufficiently intact for some or most measurements to be taken (one skull had been stolen from the site). Unfused cranial sutures in younger individuals also led to fragmentation of some skulls making them unsuitable for metric analysis.

Grade	Number	%
1	13	14.9
2	30	34.5
3	19	21.8
4	14	16.1
5	11	11.5

Table 8.17 Preservation of skeletons - % of total and number of individuals by grade

Sub-division of preservation category by age and sex showed a general trend for older subadults and young adults to be in the best preserved groups. In addition, there were seven mature adults in the poor category which reflects the greater degree of fragmentation which their bones undergo in the burial environment. Walker (1995) pointed out that older adults may be underenumerated in a cemetery population because of this phenomenon. No particular bias was noted towards one sex or the other, although older females may be expected to suffer from postmenopausal osteoporosis, when the lower bone mineral content makes degradation in the soil more likely. Those individuals in the very poorly preserved category came from areas in the cemetery where the burials were closely packed or part of the skeleton was obscured by later features.

Age and Sex Estimation
Age was estimated, in the first instance, by considering growth and development of the individual and then by assessing the gradual degeneration of the bones and teeth which starts to occur soon after maturity has been attained at around the age of 25 years. A combination of methods was employed according to which parts of the

skeleton were preserved. The term 'subadult' was used as a general description for juveniles whose long-bone epiphyses had not fused, a process which occurs earlier in girls than in boys. The age of 18 years was used as the cut-off point between adult and subadult status since eruption of the third molars and epiphyseal fusion occur around this time. Fusion of some late epiphyses such as the medial clavicle and iliac crest takes place in the early twenties and these individuals were classified as 'young adults'. Dental ageing techniques are generally considered the most accurate for juveniles and the method of Schour and Massler as modified by Hillson (1986) was used since it is considered appropriate for British populations and does not give an age range that is unduly precise. Long bone diaphyses were measured and compared with charts prepared by Stloukal and Hanakova published in the report of the Workshop of European Anthropologists (1980). Scheuer *et al.*'s (1980) method was used for the neonatal infants. There were too few subadults to allow for a serial comparison of methods but dental age and diaphyseal length accorded reasonably well. Epiphyseal fusion times were taken from Gray's Anatomy (Williams and Warwick 1980) as these are derived from European samples, as are the diaphyseal lengths.

Estimation of age in adults depended upon an assessment of pelvic features, such as the pubic symphysis (Katz and Suchey 1986) and iliac auricular surface (Lovejoy *et al.* 1985), observation of the sternal rib ends (Iscan *et al.* 1984; 1985) and scoring of the degree of dental attrition (Brothwell 1981, Miles 1962). Both the last-mentioned methods are based on comparing the rate of wear between the molars individually and establishing a standard for the population under consideration. Cranial suture closure was considered but was only used in a subsidiary capacity since even in the young adult age category there was considerable individual variation in the present cemetery sample. The pubic symphysis and sternal rib ends were considered to provide the most reliable results in the present study and their use was facilitated by casts for comparison. The auricular surface method is more difficult to apply. However, all methods tend to produce results which reflect the age structure of the reference population and their accuracy, particularly for older individuals, is subject to question. Ages are therefore given in 10 year categories with a larger category for those aged 46 years and over.

Assessment of sex also depended heavily on the presence of a well-preserved skull and pelvis and was based on methods described in Bass (1987) which estimate the robusticity of certain sexually dimorphic characteristics. Pelvic features are generally more reliable since they are less subject to the influence of age than cranial traits (Walker 1995). Secondary sexual characteristics develop at puberty and once the three parts of the innominate have fused it is normally possible to distinguish a male from a female pelvis at quite a young age, where preservation is adequate, whereas the influence of hormones on cranial musculature may not produce a robustly masculine appearance before the age of thirty. When further confirmation of sex attribution was required, an ischio-pubic ratio was calculated (Washburn 1948). Results are shown in Table 8.18.

Sex	Number
Male	46
?Male	2
Female	24
?Female	5
Indeterminate	15
Total	92

Table 8.18 Sex - number of individuals

The demographic profile of the cemetery is illustrated in table 8.19. There were two discrete burials of infants who had died in the perinatal period, one aged about 39 weeks and the other approximately 41 weeks. In addition, there were some cranial bones from a newborn infant interred with the child from Inh 3950 and a further infant femoral shaft and petrous temporal bone with Inhumations 3946 and 3910 respectively. Infants were not normally buried within the cemetery until the 4th century AD since before that time it was customary to inter newborn babies beneath the foundations of the houses or in other locations within the settlement. This practice seems to have been followed at Kempston since one neonatal burial (Inh 3983) occurred in phase 4 (late 3rd - 4th century AD) and the other (Inh 3941) in phase 5 (late 4th-early 5th century AD) (see Jackman, this vol on the five infant burials north of Church Road).

A definite age could not be attributed to one subadult (Inh 3973) since there were no complete bones preserved. There were two younger children aged 4 - 7 (Inh 3939 and Inh 3951), the latter a decapitation burial. Two older children came into the 8 - 10 year category (Inhs 3904 and Inh 3910). One of the adolescents (Inh 3969) could be sexed as female since her innominate bone had fused. The other two pelves (Inhs 3950 and 3968) were unfused and one individual (Inh 3969) had a severely deformed right arm (see below). A total of 11 burials out of 92 represents a child mortality rate of 12% (Table 8.19).

Age	Number
Subadult	11
Young adult	15
Young/middle adult	18
Middle adult	14
Mature adult	27
Indeterminate	7
Total	92

Table 8.19 Age categories - number of individuals represented*

** (All ages are approximate)*
Sub-adult - 17 years or less
Young adult - 18 - 25 years
Young/middle adult - 26 - 35 years
Middle adult - 36 - 45 years
Mature adult - over 46 years

Patterns of adult mortality suggest that the cemetery was not serving a demographically normal population (Boddington 1987). Males outnumbered females by a ratio of nearly 2:1. A similar disparity between the sexes has been found in a number of Romano-British cemeteries, particularly on urban sites with military associations such as York and Cirencester. The ratio of males to females at Trentholme Drive (Warwick 1968) was more than 4:1 and at Cirencester (Wells 1982) more than 2:1, whereas at rural Dunstable (Matthews 1981) there was only a small excess of males (46M: 40F). Male ages were almost equally distributed across the categories, whereas there were far fewer females in the younger age groups. The small number of children in the cemetery may also be related to the small number of women buried there since the children would be likely to be interred with their mothers. A village cemetery in the pre-antibiotic era might be expected to include a substantial proportion of young women whose risk of dying as a result of childbirth is greater than for those in the middle adult phase of life but this is not the case at Kempston. Allowance should be made for the fact that the mature adult category covers three decades of life whereas the young adult phase lasts only 7 years and the other age groups 10 years each. Nevertheless, almost a third of the population survived beyond the age of 45. Mean age at death was calculated as 37.7 years, taking the upper age limit as 75 years.

Site	Period	Male		
	Century	Mean (cm)	Range (cm)	No
Dunstable	3^{rd}-5^{th} (rural)	167.8	-	33
Kempston (this study)	3^{rd}-4^{th} (rural)	170.0	154.9-182.0	38
Cirencester	5^{th} AD (urban)	169.1	159.8-181.7	107
Trentholme Drive	2^{nd}-4^{th} (urban)	170.2	-	100
Castledyke	6^{th}-7^{th} (rural)	172.1	160.0-189.0	4
St Helen-on-the-Walls	10^{th}-16^{th} (urban)	169.3	154.0-184.0	240

Site	Period	Female		
	Century	Mean (cm)	Range (cm)	No
Dunstable	3^{rd}-5^{th} (rural)	159.6		24
Kempston (this study)	3^{rd}-4^{th} (rural)	160.4	151.3-177.2	17
Cirencester	5^{th}AD (urban)	157.9	147.5-169.8	44
Trentholme Drive	2^{nd}-4^{th} (urban)	155.0		30
Castledyke	6^{th}-7^{th} (rural)	160.2	149.0-168.0	26
St Helen-on-the-Walls	10^{th}-16^{th} (urban)	157.4	145.0-173.0	268

Table 8.20 Intersite stature comparison

Stature

Estimation of adult stature (Table 8.20) was undertaken by the method of Trotter and Gleser as modified by Trotter (1970). The standards were devised with reference partly to a well-nourished modern American population, many of European extraction, consisting of servicemen killed in the Korean War and partly to a sample of indigents who died in the early years of this century so there may be some inherent inaccuracy when it is applied to Europeans dating to the 4^{th} century AD. However, as the method is widely used, the results are comparable with recent work on other skeletal populations. Only bones from the lower extremity were used to calculate stature since the results are much more reliable than those derived from arm bone lengths. Means for both male and female stature were very similar to those calculated for other Romano-British cemetery populations dating to the same time period, although the range was larger for both males and females than at Cirencester. The figures were also comparable with those calculated by Dawes and Magilton (1980) for a much larger medieval series from urban York (Addyman 1980). Anglo-Saxons tended to be taller, particularly at the upper end of the scale, as demonstrated by the inhabitants of Castledyke, Barton on Humber (Boylston et al. 1998).

Population Variability

a. Metric analysis: Standard anthropological measurements were taken from the skulls and indices were calculated from these to give an idea of shape, as described in Bass (1987) and Brothwell (1981). Intact crania were used for this purpose since reconstruction introduces errors. However, only 9 male and 2 female skulls were fairly complete. The cranial index compares the ratio of length to breadth and when comparisons are

Site	Period	Male		
	Century AD	Mean	Range	No
Dunstable	3^{rd}-5^{th}	75.6	-	-
Kempston (this study)	3^{rd}-4^{th}	77.0	73.6-81.1	9
Trentholme Drive	2^{nd}-4^{th}	76.5	-	187
Castledyke	6^{th}-7^{th}	72.7	65.7-77.1	4
St Helen's-on-the-Walls	10^{th}-16^{th}	79.4	-	158
St Andrew's, Fishergate	Period 4 (10^{th}-12^{th})	75.9	72.5-80.7	849
	Period 6 (11^{th}-6^{th})	81.1	73-2-92.1	

Site	Period	Female		
	Century AD	Mean	Range	No
Dunstable	3^{rd}-5^{th}	77.6	-	-
Kempston (this study)	3^{rd}-4^{th}	76.8	75.5-78.0	2
Trentholme Drive	2^{nd}-4^{th}	75.8	-	41
Castledyke	6^{th}-7^{th}	70.46	67.2-73.9	4
St Helen's-on-the-Walls	10^{th}-16^{th}	81.1	-	184
St Andrew's, Fishergate	Period 4 (10^{th}-12^{th})	76.4	71.9-82.7	9
	Period 6 (11-6th)	79.6	73.6-89.0	13

Table 8.21 Intersite comparison of cranial indices

made between cemetery populations from different periods, certain trends become evident (Table 8.21).

The three Romano-British sites are grouped together, with a mean in the mesocranial (average or medium) range, whereas the Anglo-Saxon site of Castledyke shows a preponderance of dolichocranial (long-headed) individuals. At the later medieval period sites of St-Helen-on-the-Walls and Fishergate, both situated in York, broad or round-headedness prevails. When considered individually, four crania from Kempston fell into the mesocranial and three into the dolichranial category. The height/length index of 72.3 (males) and 73.8 (females) is also in the medium range and the height/breadth indices of 93.6 (males) and 96.1 (females) also represent average values, being between the two extremes of low and high skulls. Postcranial measurements were taken in order to calculate stature, to assist with sex estimation and in order to calculate platymeric and platycnemic indices. Antero-posterior flattening of the femur and mediolateral flattening of the tibia are commonly found in modern primitive populations and early Europeans (Buxton 1938). Their cause is uncertain but such modifications in shape are thought to be mechanical adaptations which, particularly in the case of platycnemia, may be associated with adopting a squatting posture. Both platymeria and platycnemia appear to be more common in females than males and flattening is often more pronounced on the left side (Brothwell 1981).

The male means for platymeria at Kempston of 78.5 (right) and 79.2 (left) are very similar to the figure of 79.2 quoted by Buxton for Romano-Britons in general. He specifies 84.1 as the average for modern Americans and 76.6 for American Indians from Arkansas. Female means were similar (78.4 - right and 77.5 - left). The great majority of both male and female tibiae were platymeric and most femora were eurycnemic or mesocnemic (male means: right 72.2, left 69.6; female means: right 74.1, left 70.6).

b. **Non-metric analysis**: These consist of minor anatomical variants which are scored as present or absent since they cannot be measured on an interval scale (Saunders 1989). They are thought to be genetically mediated although experimental studies have shown that there is no straightforward Mendelian mode of inheritance. Cranial traits consist mainly of variations affecting the sutures (e.g. retention of the metopic suture in the frontal bone), additional ossicles (e.g. in the lambdoid suture) and variations in the number and shape of foramina for the blood vessels. Some postcranial traits may be functionally induced, e.g. squatting facets on the distal tibiae or changes in the reaction area of the femoral neck (e.g. plaque).

Trait	Kempston	%	Cirencester	%
Metopism	6/50	12.0	16/194	8.2
Lambdoid ossicles	23/42	54.8	149/239	62.3
Septal aperture	10/119	8.4	12/264	4.5
Vastus notch	5/87	5.7	20/169	11.8
	Castledyke	%	Kingsworthy	%
Metopism	8/74	10.8	5/56	8.9
Lambdoid ossicles	28/73	38.4	30/70	47.1
Septal aperture	38/113	33.6	7/94)	7.4
Vastus notch	0/83	0	6/56	10.7
	Norton	%		
Metopism	7/47	15.0		
Lambdoid ossicles	9/33	27.0		
Septal aperture	21/45	47.0		
Vastus notch	4/36	11.0		

Table 8.22 Intersite comparison of non-metric traits

Non-metric traits were recorded by employing the diagrams provided by Berry and Berry (1967) and Finnegan (1978). Reference was also made to revisions of these methods published in *Standards for Data Collection from Human Skeletal Remains* (Buikstra and Ubelaker 1994). A total of 24 cranial and 26 postcranial traits were scored for all adults. Since the numbers were small, they were not separated according to sex or age, although the presence of some traits (e.g. absence of third molars) may be affected by the size of the individual and therefore occur less frequently in males (Saunders 1989). Some of the most common traits were then compared between cemetery populations (Table 8.22). Trait prevalence at Kempston for lambdoid ossicles and septal aperture seems to follow the pattern established by Wells at Roman Cirencester and Anglo-Saxon Kingsworthy, rather than that seen at the northern early Anglo-Saxon sites of Castledyke and Norton (Marlow *et al.* 1992). There seems to be a fairly consistent low level of metopic suture in most populations. Matthews (1981) discerned a similar pattern at Dunstable with metrical analysis. Once DNA analysis becomes a routine procedure, it may be possible to confirm or refute these suggestions.

Dental Health and Disease

Awareness of the importance of dental hygiene is a relatively recent concept (Roberts and Manchester 1995) and the inhabitants of Kempston in the third and fourth centuries AD were no exception in their disregard of this. Although most dentitions were intact, as they normally are under conditions which are favourable to preservation of bone, almost all of them showed evidence of one or more types of pathology. These are summarized in table 8.23.

A total of 73 dentitions was available for observation containing 1460 permanent and 47 deciduous teeth. These were examined for the presence of caries (cavities), abscesses, calculus (tartar), enamel hypoplasia, periodontal disease and any anomalies in number or position of teeth. Antemortem and post-mortem loss was also recorded. Only 174 teeth (11.9%) had been lost postmortem and these were mainly single-rooted teeth. The frequency of antemortem tooth loss was very high (247 - 16.9%), particularly for the females (25.3%), although the prevalence is similar to that recorded at other Romano-British sites (Roberts and Manchester 1995) such as Kingsholm (15.1%) and Baldock (20.1%). Anglo-Saxon cemetery populations tend to show lower rates of tooth loss (Castledyke 5.9%). Antemortem tooth loss was significantly greater in females than in males ($p=<0.001$) but this is probably due to the higher proportion of elderly women buried in the cemetery.

Dental pathology was also studied by considering the number of individuals affected by each condition in order to see if there were any differences between the sexes (Table 8.24). Antemortem tooth loss is more common in females, enamel hypoplasia in males.

Caries

These are denoted by areas of demineralization of the tooth caused by the interaction of sugar (sucrose) and bacteria contained in the plaque which adheres to the teeth. They were recorded with reference to size and position on the tooth. During the Romano-British period, it was common for prevalence to increase with age (Manchester 1983) and few caries are found in the teeth of children and young adults at Kempston as at other sites. The first molar was the tooth most often affected by this disease and, in addition, most molars lost antemortem were probably destroyed by caries so the true prevalence is likely to have been much higher. Male mandibular and female maxillary teeth were particularly susceptible. Prevalence rates of 8.6% for males and 9.1% for females gave an overall frequency of 8.2% when subadult teeth were included. This is very similar to the figure of 8% calculated for one of the urban cemeteries from Baldock (Roberts and Manchester 1995) at the same period and is considerably higher than the caries rates for Trentholme Drive, York (4.4%) and Cirencester (5.1%) whose values are comparable with those derived from early Anglo-Saxon sites such as Norton (3.4%) and Castledyke (5.4%).

Abscesses

These are represented by circular perforations in the alveolar bone caused by pus which tracks down the tooth root and has to find a means of escape. They normally originate from a carious infection of the pulp cavity. Thirty-four abscesses were recorded affecting 1.9% of tooth sockets and they were much more likely to be found in the maxilla than the mandible, although X-ray examination of all jaws might rectify this imbalance since the bone of the maxilla is much less robust than that of the mandible and therefore more likely to perforate. Abscesses also tend to be less frequent in early Anglo-Saxon cemetery populations (Norton 0.7%; Castledyke 0.1%) than at other Romano-British sites such as Cirencester and Baldock (both 1.2%).

Calculus

Deposits of tartar on the teeth result from the mineralization of plaque by calcium derived from the saliva. Both sexes were affected equally by this condition (Tables 8.23 and 8.24) and more than half of all remaining teeth were involved. Where the alveolar bone had receded the deposits were often subgingival in location. The anterior teeth often had heavy deposits on their buccal and lingual surfaces and first molars also showed extensive calculus formation. Subadults were less likely to be affected and prevalence rates increased with age.

	Male & ? Male		Female & ? Female		Adult		Subadult permanent		Subadult deciduous	
	No	%	No	%	No	%	No	%	No	%
Total teeth	872	77.9	451	73.4	16	100	121	91.6	47	88.7
Postmortem loss	115	10.3	48	7.8	0	0	11	8.3	6	11.3
Antemortem loss	132	15.1	115	25.3	0	0	0	0	0	0
Caries	75	8.6	41	9.1	1	6.3	2	0.4	1	2.1
Calculus	521	59.7	264	58.5	12	75.0	39	32.2	9	19.1
Enamel hypoplasia	43	4.9	19	4.2	0	0	22	18.2	0	0

Table 8.23 ***Dental pathology - numbers of teeth affected***

	Male & ? Male	%	Female & ? Female	%	Adult	%	Subadult	%
Dentitions	41		24		1		7	
Postmortem loss	29	70.7	18	75.0			4	57.1
Antemortem loss	24	58.5	16	66.6	0		0	
Caries	21	51.2	13	54.2	1	100	3	42.9
Calculus	37	90.2	22	91.7	1	100	4	57.1
Enamel hypoplasia	15	36.6	7	29.2	0		2	28.6
Periodontal disease	32	78.0	18	75.0	1	100	0	

Table 8.24 ***Dental pathology - number of individuals affected***

Enamel Hypoplasia

This is one of the more reliable indicators of episodes of stress which have occurred in childhood since tooth enamel, unlike bone, does not remodel once it is formed and therefore defects are permanent. Events such as a childhood fever or episode of malnutrition may cause a temporary arrest in the growth of the enamel which is manifested by a line or groove in the tooth surface. The male mandibular canine was most often involved. The canines take longer to develop than the incisors and therefore are most suitable for detailed study. Two of the three adolescents from Kempston demonstrated grooving of multiple teeth; one of them a girl with a deformed right arm who also had cribra orbitalia of both orbits (see below). However, only a small number of adult teeth were affected and there was no difference between the sexes (M 4.9%; F 4.2%). One young adult male (Inh 3963) showed severe hypoplasia with deep grooving of all his maxillary incisors and canines.

Periodontal Disease

This condition occurs when the alveolar bone recedes exposing much of the tooth root and may eventually lead to antemortem tooth loss. Periodontal disease happens in modern times with advancing age, particularly after 40 years and is associated with inflammation of the gums (gingivitis) caused by trapped food particles. In the past, this process was exacerbated by heavy calculus deposits on the teeth which also irritated the gums. However, scoring of severity, which was assessed by the method of Brothwell (1981), is complicated by continuous eruption of the teeth which is designed to compensate for attrition (Roberts and Manchester 1995).

Three quarters of both male and female dentitions from Kempston were affected by periodontal disease. As expected, those individuals in the middle aged and mature adult categories were most severely affected, although one young/middle adult had an aggressive form of periodontal disease.

Dental Anomalies

Alterations in tooth numbers, position and eruption account for most dental anomalies in archaeological populations and most of these are related to the size of the jaws which have become reduced in man over time and are sometimes inadequate to accommodate a full dentition. Seven males demonstrated agenesis of one or more third molars. This condition is governed by hereditary factors: when the tooth bud fails to reach a certain size, the tooth fails to develop (Saunders 1989). Three males (Inh 3912, Inh 3964 and Inh 3977) had no mandibular third molars (M3s), two had agenesis of all 4 M3s (Inh 3908 and Inh 3933), one had probable agenesis of one maxillary M3 (Inh 3909) and in Inh 3982 the right maxillary and mandibular M3s had failed to develop, whereas the left mandibular M3 had become impacted and had grown horizontally in the jaw (Plate 8.39). There was also congenital absence of teeth in other positions, namely the maxillary lateral incisors and one mandibular lateral incisor in Inh 3923 and the maxillary lateral incisors in Inh 3901. Both maxillary canines had been shed shortly before death in one young adult male (Inh 3961). Six males (Inhs 3912, 3922, 3924, 3931, 3959 and 3974) and 2 females (Inhs 3903 and 3946) had crowding of one or more teeth, in two cases (Inhs 3912 and 3974) this was caused by retention of a deciduous tooth into adult life. Seven males (Inhs 3908, 3922, 3923, 3924, 3931, 3967 and 3974) and one female (Inh 3946) showed rotation of one tooth. One adolescent (Inh 3950) demonstrated delayed eruption of the right maxillary canine and premolar with retention of the deciduous teeth in those positions.

A more unusual anomaly was the presence of enamel pearls on the roots of the right maxillary second and third molars in Inh 3922 (Plate 8.17). The second molar had pearls on both sides of the tooth. Hypercementosis was seen on the roots of a maxillary molar from Inh 3948 and the on the left maxillary incisors of Inh 3918. There was an additional cusp on the left maxillary second molar of Inh 3931 and on the first right maxillary molar of Inh 3969.

Palaeopathology

Trauma

A study of the pattern and distribution of trauma in a particular society may give a good indication of its lifestyle, occupation and economy (Roberts and Manchester 1995). In addition, evidence of interpersonal violence is frequently recorded on the skeleton (Plate 8.13). Trauma may be subdivided into several different categories.

Fractures: The pattern of fractures at Kempston is illustrated in table 8.25. By far the most commonly fractured long bone was the left fibula, for both males and females (M: 5/34 - 14.7%; F 3/21 - 14.3%). At the present time, this is a common fracture in skiing accidents, where the ankle is rotated round an axis provided by the stationery tibia. In the past, it could have been caused by walking on rough ground (Wells 1982). The fibula was the second most commonly fractured bone at Cirencester (after the rib), although the overall prevalence was only 5.6%, compared with 9.5% at Kempston.

One male (Inh 3942) had sustained a double fracture of the left distal tibia in conjunction with the proximal fibula (contrecoup fracture) and these were well-healed although there was some overlap between the broken ends (Plate 8.25). Rib fractures were also relatively common, particularly among the males (Plate 8.32). Often multiple ribs were fractured and some ribs had been broken a short time before death since callus formation was still present in an unremodelled state.

Wells stressed (1982) that rib fractures (particularly on the left side) are often caused by interpersonal violence unless the break is situated in the neck region, when it is more likely to be due to a fall. Most fractures at Kempston were mid-shaft in position, although sometimes a fragment was difficult to orientate by side. Ten males (20.8%) had at least one rib fracture, as opposed to one female (3.4%).

An elderly male (Inh 3982) had been the victim of numerous traumatic events (or one very severe event) and had fractures of both clavicles, the left ulna and several hand bones. He had also sustained a crush injury of the left trapezium and left first metacarpal which had evidently caused an open wound since these two bones showed signs of infection (Plate 8.38).

An overall fracture rate was calculated for all limb bones, including the clavicle (Plates 8.3 and 8.14), and this gave a prevalence of 2.6% (21/805). This figure is quite high and equates to the figure for the Medieval hospital of St James and St Mary Magdalene at Chichester (Judd 1998), where fractures could potentially be expected to be frequent since these institutions catered for the aged and infirm. The figure for Cirencester was 0.9%. Eighteen males (37.5%) and eight females (27.6%) from Kempston had healed or healing fractures. There was one probable greenstick

Skeletal element	Male				Female				Total	
	Right	%	Left	%	Right	%	Left	%	No	%
Clavicle	2/31	6.5	2/29	6.9	1/22	4.5	0/19	0	5/101	4.95
Radius	1/36	2.8	1/38	2.6	0/18	0	0/17	0	2/109	1.83
Ulna	1/38	2.6	1/39	2.6	0/20	0	1/19	5.3	3/116	2.59
Tibia	0/36	0	1/39	2.6	0/22	0	0/23	0	1/120	0.83
Fibula	1/33	3.0	5/34	14.7	1/17	5.9	3/21	14.3	10/105	9.52
Ribs	4/37	10.8	6/38	15.7	1/18	5.6	0/17	0	11/110	10.0
Mandible	0/34	0	0/34	0	0/19	0	1/18	5.6	1/105	0.95
Hand (metacarpal)	0/41	0	2/43	4.7	0/19	0	0/18	0	2/121	1.65

Table 8.25 Fractures

Inh no	Sex	Age	Type of Trauma
3906	Male	Young/middle adult	Cut mark (deep groove) on right humeral head (Plate 8.10)
3931	Male	Young/middle adult	Trauma to right wrist (crushed lunate bone) (Plate 8.22)
3933	Male	Middle adult	Trauma to 2nd right rib (misshapen head and neck)
3936	Male	Young adult	Amputation/ununited fracture of right proximal hand phalanx (Plate 8.24)
3944	Male	Young adult	Trauma to right foot (talar navicular articulation)
3946	Female	Mature adult	Depressed fracture on right frontal bone
3956	Male	Middle adult	Shoveller's fracture of 1st thoracic vertebra
3957	Male	Middle adult	Shoveller's fracture of 7th cervical vertebra (Plate 8.29)
3961	Male	Young adult	Trauma to left foot (flattening of head of talus)
3963	Male	Young adult	Depressed fracture of left temporal bone (Plate 8.31)
3964	Male	Mature adult	Crush injury to second left proximal hand phalanx (Plate 8.33)
3966	? Female	Mature adult	Stress fracture of 3rd right metatarsal
3967	Male	Young/middle adult	Depressed fracture on right frontal bone
3974	Male	Young adult	Trauma to right calcaneus
3977	Male	Mature adult	Cut marks on right clavicle (Plate 8.37)
3982	Male	Mature adult	Crush injury of left trapezium with infection of 1st metacarpal

Table 8.26 Other types of trauma

Inh no	Sex	Age	Evidence for decapitation
3901	Female	Young adult	6 cut marks on anterior aspect of axis and transverse split through vertebral body and neural arch (Plate 8.1 and 8.2)
3903	Female	Young adult	Oblique slice through 4th cervical vertebra from the front, right to left, which has removed left apophyseal facets (Plate 8.4)
3905	Female	Middle adult	Possible slice through antero-inferior aspect of 5th cervical vertebra from the front (margin rather irregular) (Plate 8.7)
3906	Male	Young/middle adult	Oblique slice through 5th cervical vertebra (inferior aspect) from the front - right to left; shock has fractured neural arch; some splitting of right lamina superiorly also (Plate 8.8 and 8.9)
3914	? Male	Young/middle adult	All vertebrae have disintegrated
3920	Male	Young/middle adult	Post-mortem. ?cut nicked inferior aspect of C3. Part of 4th cervical vertebra missing
3933	Male	Mature adult	Cut probably made between 3rd and 4th cervical vertebrae. Only fragments remain. Left lamina of C4 is split
3938	Adult	Middle adult	Post-mortem. Only a small fragment of 3rd cervical vertebra remains. Possible oblique slice through vertebral body but break is irregular
3951	Subadult	5 - 7 years	Post-mortem. Fragmentation of 3rd cervical vertebra, but no cut marks
3957	Male	Middle adult	Cut from the front between 5th and 6th cervical vertebrae ; at least two cuts from both left and right with a sharp weapon; flange on neural arch
3972	Female	Mature adult	Cut marks on 3rd cervical vertebra (inferior aspect); flange indicates they were made from left to right
3977	Male	Mature adult	Cut marks on 7th cervical vertebra (superior and inferior aspects) made from left to right also cutting right clavicle (Plate 8.37)

Table 8.27 Decapitation

	Male		Female	
	Partial	Complete	Partial	Complete
Fused	2 (?3971, 3952)	1 (3956)	0	1 (3965)
Unfused	2 (3921, 3974) 1 (3961 lumbarization)	0	2 (3958, 3980)	0
Total	6/41 sacra 14.6%		3/22 female sacra 13.6%	

Table 8.28 Sacralization - individuals affected

fracture in a child aged 9 or 10 years (Inh 3910) indicated by thickening of the right tibial shaft. X-ray was inconclusive but fracture seems the most likely diagnosis (Plate 8.12). The fracture line is often remodelled completely in children and is therefore not visible.

Other trauma-induced pathology: Considering the small sample size, there were numerous examples of other types of trauma which did not fit into the fracture category (Table 8.26). One of the more unusual of these was a probable amputation of a right thumb which appeared to have been transected in the centre of the proximal phalanx (Plate 8.24); whether this was the result of a deliberate act or an accident is a matter for speculation. The alternative diagnosis of an ununited fracture seems less probable.

Two males and one female had sustained depressed fractures of the skull; two of these affected the frontal bone with only minor contour change but the third (Inh 3963) had caused quite a large depression in the left temporal bone just above the zygomatic arch and was probably the result of attack with a blunt object such as a club (Plate 8.31). Two males had evidence of clay shoveller's fractures which are being recognized with increasing frequency in archaeological populations (Knüsel *et al, 1996)*. They represent an avulsion fracture of the spinous process of the 7th cervical or 1st thoracic vertebra caused by the action of the trapezius and rhomboid muscles when throwing heavy soil upwards at an awkward angle (Plate 8.29). There was also an unusually high frequency of trauma to the feet when compared with rural populations dating to the early Anglo-Saxon period (Boylston *et al.* 1998). Two young males (Inhs 3944 and 3961) showed evidence of large osteophytes at the articulation between the talus and navicular bones. In addition to five feet from further burials showed evidence of osteoarthritic change which may also have resulted from trauma. All but two of the individuals who had suffered from these types of trauma were males.

Decapitation: Ritual removal of the skull shortly after, or at the time of death is a rather specialized form of trauma which was practised on males, females and one child at Kempston (Table 8.27). In all cases except one (Inh 3957), the cranium was subsequently placed near the legs or feet of the burial. Five of the twelve inhumations subjected to this practice showed evidence of cut marks on the vertebrae, all the vertebrae in one further individual had disintegrated and the remaining six showed only post-mortem degradation and fragmentation of the affected vertebrae. Where there were definite cut marks, the vertebrae affected appeared to be placed either higher or lower on the neck than in those individuals exhibiting post-mortem changes alone.

One young woman (Inh 3901), buried inside a ritual enclosure at the eastern end of the cemetery, had six cut marks on her axis vertebra which had also been sliced through from the front in such a way that the neural arch had been split (Plate 8.1, 8.2) and the 3rd and 4th cervical vertebrae were destroyed. The cut marks on the 5th cervical vertebra of a young/middle adult male (Inh 3906) had also been made from the front and transected the vertebral body diagonally from right to left (Plate 8.8). There was a further possible cut mark on the superior aspect of the same vertebra which had split the lamina. In the case of Inh 3957 (a middle-aged male), the superior surface of the 6th cervical vertebral body and articular facets had been removed by a sharp weapon (at least two slices from right and left (Ortner, pers comm), one of which had cut the right side of the fifth cervical vertebra obliquely). The right sided cut had hit the more dense bone of the spinous process (Plate 8.37). An elderly woman (Inh 3972) had probable cut marks on the inferior aspect of her third cervical vertebra which also displayed a flange suggesting that the cuts had been made from left to right and an elderly man (Inh 3977) had demonstrated cut marks on the superior aspect of the 7th cervical vertebra which had sliced through the neck with such violence from left to right that the weapon had also cut into the right clavicle in the mid-shaft region. There was also an oblique slice through the antero-inferior aspect of the vertebral body.

Where the cut marks have a polished appearance, the bone must have contained the same amount of collagen that it did in life and therefore decapitation - if not the cause of death - was carried out immediately after it had occurred. Splitting of the laminae also indicates that the musculature and ligaments were also present and intact. Certainly most, if not all, decapitations took place with the victim in a supine position. Where there were no definite cut marks, the procedure was normally carried out in the region of the 3rd and 4th cervical vertebrae as described by Clarke (1979) at Lankhills. The more unusual traumatic lesions were placed either higher (e.g. the axis vertebra) or lower on the neck (6th or 7th cervical vertebrae).

Congenital and Developmental Abnormalities

Congenital anomalies are present at birth and developmental conditions generally become apparent during the period of growth or in young adulthood. Many of the former are incompatible with life and are, therefore, seldom found archaeologically. However, an injury, which probably occurred at birth, was documented at Kempston in an adolescent girl aged between 14 and 16 years (Inh 3969). She had sustained damage to the brachial plexus (Erb's paralysis), with the result that the entire right arm, including the scapula, clavicle and right hand had suffered disuse atrophy of both bone and soft tissues (Manchester, pers comm). There was a considerable disparity in size due to restricted growth in the affected limb (Plate 8.6). In life, the arm would have been held at her side and her left arm had evidently compensated by increased muscular development, as demonstrated by the cortical defect at the insertion of pectoralis major. The differential diagnosis includes paralysis caused by a viral infection such as polio or a congenital condition like cerebral palsy. However, the right leg would probably also have been affected in the latter case. She also had minor developmental defects affecting her spine (Plate 8.35). The first sacral vertebra was separated from the rest of the sacrum and was asymmetrical (lumbarization) and she probably suffered from a slight scoliosis indicated by minor abnormalities in the vertebrae (Ortner, pers comm).

The intricate embryological developmental sequence of the spine results in many minor errors of segmentation, most of which are asymptomatic. They generally occur at the interface between two different types of vertebra (e.g. the lumbosacral junction) where transitional vertebrae may result (Plate 8.30). Sacralization was quite common at Kempston with 14.6% of male and 13.6% of female 5th lumbar vertebrae adopting the morphology of the first sacral vertebra, either uni- or bilaterally (Table 8.28). Sometimes fusion with the sacrum had occurred but in every case there was an element of torsion which could have caused lower back pain during life.

Spina bifida occulta is diagnosed when the vertebra is unfused at the neural arch with no protrusion of the spinal cord or meninges. It is most commonly found in the sacrum and during life the gap would have been filled with fibrous connective tissue (Resnick and Niwayama 1988). Spina bifida of one or more sacral vertebrae may occur in up to 25% of the sacra in an archaeological population (Turkel 1989). Eleven of 61 sacra from Kempston (18%) demonstrated this condition (M 8/41; F 3/22). In one sacrum (Inh 3922) all the vertebrae were affected (Plate 8.15) and possibly also in a second but post-mortem damage had obscured some of the rounded edges. The other nine had two or more affected vertebrae (Table 8.29).

Male		Female	
Inh no	Vertebra	Inh no	Vertebra
3922	entire sacrum	3928	S4 & S5
3956	? entire sacrum	3940	S3-S5
3906	S4 & S5	3946	S1
3921	S1, S4, S5		
3936	S4 & S5		
3944	S3-S5		
3959	S4 & S5		
3977	S1, S2, S4, S5		

Table 8.29 Spina bifida - individuals affected

The term spondylolysis describes a stress fracture which separates the neural arch from the body of the vertebra, either partially or completely, although a cartilaginous bridge is maintained in life. There is probably a genetic predisposition since most of these lesions become evident between the ages of 6 and 20 years (Turkel 1989). Between 3% and 7% of the members of a particular population may be affected (Wiltse *et al.* 1976). A congenital weakness at the site predisposes the bone to fracture, often as a result of such actions as bending and lifting. The 5th lumbar vertebra is most likely to be involved (67%). Spondylolysis (Table 8.30) was not particularly prevalent at Kempston (4 or 5 of 60 5th lumbar vertebrae (Plate 8.5); 1 of 57 fourth lumbar vertebrae), particularly when compared with the early Anglo-Saxon cemetery at Castledyke where five L5s, two L4s, two L2s and one L6 were separated from the neural arch.

Male Inh no	Vertebra affected	Female Inh no	Vertebra affected
3945	L5 (partial)	3903	L5 (complete)
3976	L5 (partial)	3918	L5 (? Partial PM damage)
		3925	L4 (complete, with listhesis)
		3949	?L5 (with listhesis)

Table 8.30 Spondylolysis - individuals affected

Additional problems may result when there is forward displacement of the vertebra with spondylolysis causing spondylolisthesis, bone-to-bone contact with erosion of the end-plates of adjacent vertebral bodies (Plate 8.18). Other minor spinal anomalies included two sacra with six vertebrae instead of the normal five (Inhs 3915 and 3981). Minor malformations of the apophyseal joints of the 12th thoracic vertebra and at the lumbo-sacral joint were seen in Inh 3905.

A series of minor congenital abnormalities was found in the young adult male buried in grave 22 (Plate 8.16). His skull was elongated at the base forming an unusually wide angle at the basi-occipital synchondrosis or platybasia (Manchester, pers comm). The metopic suture had been retained into adult life and there was frontal and parietal bossing, particularly marked on the right side. The sutures of the cranial vault were fusing a little prematurely, especially on the right side. The nasal aperture was much narrower than the normal range for this population. In addition, there were other developmental anomalies such as spina bifida and sternal foramen. It is impossible to say whether any mental defects would have accompanied these physical alterations to the skull.

An unusual pseudarthrosis (false joint) was found between the calcaneus and navicular of the left foot in Inhs 3905 and 3966 which may suggest that these two individuals were related.

Non-specific Infection

Bacterial infections in bone are termed osteomyelitis if the entire bone is affected, including the marrow cavity, osteitis if they involve the cortical bone and periostitis if the inflammation is superficial and is characterized by a sub-periosteal reaction. Non-specific infections, where the organism is unknown (most often staphylococcus, streptococcus or pneumococcus) may be caused by localized trauma, a penetrating wound (e.g. in septic arthritis) or they may be blood-borne, following a sore throat or other soft tissue infection. Specific infections include tuberculosis, leprosy and the treponematoses, e.g. syphilis.

Periostitis: The most common sites for non-specific infection of bone are the tibia and fibula, occasionally the femur, often affected in the same individual at Kempston. Such periostitis may represent the early stage of a specific infection such as leprosy, particularly where the changes are bilateral, but without evidence of characteristic changes in the hands and feet or skull, it is impossible to be certain. Non-specific infection may indicate low levels of stress in a population (Goodman *et al.* 1988). Tibial periostitis was found in 25% of tibiae in the present study (Table 8.31). This is a much higher prevalence than the figures of 10-12% recorded by Wells at Cirencester (Wells 1982) and also considerably more than the 6 - 7% of tibiae affected at Castledyke in the 6th - 7th centuries AD (Boylston *et al.* 1998). The figures are more like those of 18% quoted in Stroud and Kemp (1994) for the late Medieval site at Fishergate in York.

Maxillary sinusitis: This is denoted by porosity or formation of irregular patches of new bone on the walls of the sinus chamber (Lewis *et al.* 1995). Sinusitis may be caused by upper respiratory infections, allergies or environmental pollution such as that caused by living in a smoky atmosphere. Unfortunately, it is often difficult to separate changes caused by infection which has spread from a dental abscess from true sinusitis. There was one instance where the posterior part of the left maxillary had been destroyed by such an abscess. Only those sinuses where the facial bones were broken were recorded. Eighteen of 63 maxillary antra (28.6%) were affected, compared with 38% found by Lewis *et* al. (1995) at the Medieval rural site of Wharram Percy.

Rib lesions: New bone formation on the visceral surfaces of the ribs has recently been described by Kelley and Micozzi (1984). It appears to be associated with chronic chest infections which are sufficiently long-standing for the pleura (the membranes surrounding the lungs) to become inflamed and for this infection to be transmitted to the adjacent bone. Multiple ribs were affected in four males from Kempston, three on the right side and four on the left (Inhs 3944, 3953, 3956 and 3908). **Osteitis:** Gross thickening of the distal half of the right femur was associated with a severe infective process of the left tibia and fibula in one elderly male (Inh 3927). There were flowing deposits of new bone on the medial and interosseous surfaces of the tibia and thick diagonal bands of new bone on the fibula (Plate 8.21). It is possible that these lesions represent a specific infection caused by one of the treponematoses but, as the

ite of infection	Male				Female				Total	
	Right	%	Left	%	Right	%	Left	%	n	%
ibia	11/36	30.6	9/39	23.1	5/22	22.7	5/23	21.7	30/120	25.0
ibula	5/33	15.2	5/34	14.7	1/17	5.9	3/21	14.3	14/115	12.2
laxillary sinus	6/20	30.0	5/19	26.3	2/13	15.3	5/11	45.5	18/63	28.6
ibs	3/37	8.1	1/38	2.6	0/18	0	0/17	0	4/110	3.6

able 8.31 Non-specific infection - individuals affected

ontralateral tibia and fibula are unaffected, it is more ikely that the infection resulted from an ulcer or ocalized infection of the left lower leg (Ortner, pers omm). Another male (Inh 3986) also had osteitis but his only affected the left distal femur.

Metabolic disease: Dietary deficiencies in vitamins, race elements and iron may leave their mark on the iuman skeleton, although the evidence is sometimes lifficult to interpret. Cribra orbitalia is thought to be issociated with iron deficiency anaemia and is one of the nain indicators of stress which is available for assessing he fitness of past populations and their adaptation to the environment. Lesions were graded in severity according o a system devised by Stuart-Macadam (1991). Cribra orbitalia was quite common at Kempston with 7/48 (14.6%) males and 3/29 (10.3%) females demonstrating porosity of one or both orbital roofs. In four males the esions were bilateral and in three unilateral (Table 8.32). Most were of moderate severity. Two females had bilateral changes, as did two subadults. The disparity between males and females is probably due to the much larger number of males who died in young adulthood since the lesions often heal and are therefore less common in older adults.

Orbit	Male	%	Female	%	Subadult	%
Right	5/31	16.1	2/19	10.5	2/8	25.0
Left	6/29	20.7	2/19	10.5	2/7	28.6
Total	11/60	18.3	4/38	10.5	4/15	26.7

Table 8.32 Cribra orbitalia - orbits affected

Rickets is caused by a lack of vitamin D and affects young children, particularly those living in crowded conditions. The bones are poorly mineralized and bend when the child walks. Rickets is mainly associated with the rise of urbanization in the 17th and 18th centuries in this country. It would not normally be expected in a rural situation where sunlight is plentiful to make up for any dietary deficiency of vitamin D. However, two males from Kempston (Inh 3923 and 3956) showed probable evidence of healed rickets with antero-posterior bowing of both tibiae and some retroversion of the tibial condyles (Plate 8.19). Osteomalacia is the adult form of rickets and is caused by malabsorption syndromes or excessive loss of vitamin D due to kidney or gastrointestinal disease (Roberts and Manchester 1995). A young/middle adult female (Inh 3911) appears to have suffered from this disease since her right clavicle and the remaining fragment of pelvis are considerably thinned and atrophied (Plate 8.11).

Osteoporosis is due to a shortage of calcium and occurs mainly in later life, particularly in postmenopausal women due to the decline in oestrogen levels. It is characterized by a decrease in bone mass, although not in the quality of the bone. The trabeculae of the vertebrae are particularly severely affected leading to vertebral collapse and severe pain. Two elderly women (Inhs 3925 and 3932) demonstrated vertebral changes with the classic 'codfish' appearance of the 12th thoracic vertebra (Plate 8.23). Osteoporosis probably affected several other individuals but measurements of bone mineral content would be required to confirm or refute this supposition. Hyperostosis frontalis interna, or thickening on the internal surface of the frontal bone is also found mainly in postmenopausal women and is thought to be due to changes in the secretion of pituitary hormones (Ortner and Putschar 1981). This condition was demonstrated by the elderly female from Inh 3928.

Neoplasia: Only benign neoplastic lesions were recorded at Kempston. There were small ivory osteomas recorded on the cranial bones of Inhumations 3957, 3962 and 3978. These are common tumours which are normally quite small, are composed of hard, dense bone and occur in groups of two or three on bones such as the skull vault which are formed in membrane.

Joint disease: The most ubiquitous of all palaeopathological conditions, degenerative joint disease increases in frequency with age and, in conjunction with enthesopathies (or new bone formation at the insertion of tendons and ligaments), may give an indication of the kind of occupations practised by a particular group of people when differences are compared between populations. However, some enthesopathies are more likely to be age related.

Spinal joint disease: For the purposes of this analysis, pathological changes were separated into those affecting the vertebral body (spondylosis deformans), which are mainly caused by degeneration of the intervertebral discs, and those which involve the apophyseal joints connecting the vertebrae. These are synovial joints and may therefore become osteoarthritic. The grading system followed that proposed by Sager (1969) for the cervical vertebrae. Changes recorded on the vertebral bodies were osteophytes (bony outgrowths projecting from the vertebral end plates), surface porosity and Schmorl's nodes (herniations of disc material through the vertebral body end plate). Comparison of the number of vertebral bodies affected between males and females are shown in Table 8.33. In the males osteophytes were most frequent on the 6th cervical, 9th thoracic and 4th lumbar vertebra; in the females the 7th thoracic vertebra showed the highest rate.

Type of vertebra	Pathology	Male		Female	
		No	%	No	%
Cervical	Osteophytes	37/194	19.1	24/117	20.5
	Porosity	31/194	16.0	25/117	21.4
Thoracic	Osteophytes	127/356	35.7	69/228	30.3
	Porosity	25/356	7.0	9/228	39.4
	Schmorl's nodes	135/356	37.9	52/228	22.8
Lumbar	Osteophytes	67/176	38.1	49/105	46.7
	Porosity	8/176	4.5	10/105	9.5
	Schmorl's nodes	49/176	27.8	9/105	8.6

Table 8.33 Spondylosis of vertebral bodies and Schmorl's nodes

Males had a higher percentage of vertebrae affected by osteophytes in the thoracic and females in the lumbar region. The prevalence of Schmorl's nodes was considerably higher in the males and this is probably an indication of greater use of the spine for carrying heavy loads, etc. at a young age when the vertebral end plates are still impressionable.

Facet joints were assessed for the presence of marginal osteophytes, porosity of the articular surface and eburnation (polishing) which indicates bone-to-bone contact and therefore the destruction of cartilage. All these conditions were more common in the female cervical vertebrae, probably reflecting the greater proportion of elderly females in the group (Table 8.34). Again, osteophytes were more common in the male thoracic spine and in the female lumbar spine, the latter reflecting those areas where the presence of spondyloysis and spondylisthesis had caused instability and consequent degenerative change.

Type of vertebra	Pathology	Male		Female	
		No	%	No	%
Cervical	Osteophytes	19/194	9.8	34/117	29.1
	Porosity	11/194	5.7	17/117	14.5
	Eburnation	7/194	3.6	19/117	16.2
Thoracic	Osteophytes	72/356	20.2	39/228	17.1
	Porosity	18/356	5.1	21/228	9.2
	Eburnation	7/356	2.0	12/228	5.3
Lumbar	Osteophytes	33/176	18.8	30/105	28.6
	Porosity	13/176	7.4	8/105	7.6
	Eburnation	8/176	4.5	8/105	7.6

Table 8.34 Osteoarthritis of vertebral facet joints

Osteoarthritis of the synovial joints: Osteoarthritis is denoted by the deterioration of cartilage on the joint surfaces, without inflammation. It may be a primary systemic disease, when many joints are affected in a symmetrical fashion, or may be secondary to some underlying condition or trauma which has affected the integrity of the joint. Some individuals appear to be more susceptible than others through genetic predisposition, although only 1-5% of cases present before the age of 45 (Roberts and Manchester 1995). All joint surfaces were examined for the presence of marginal osteophytes, porosity or subchondral cysts, eburnation and surface contour change. Osteoarthritis was only diagnosed when there was definite evidence of eburnation or large cysts with contour change since osteophytosis alone may indicate age-related degeneration of cartilage and not an early stage of the disease (Table 8.35). Osteoarthritis of the hip in males was the most common form of the disease found in the major joints. Seven males and one female had one arthritic hip and both hips were affected in one other male (Inh 3952) who also had osteoarthritis of both elbows, the right wrist, cervical and lumbar regions of the spine and some costovertebral joints. The only female with the disease also had generalized osteoarthritis affecting the cervical and lumbar regions of the spine, both hands, the right acromioclavicular and many costo-vertebral joints. One mature male (Inh 3927) had a very severely arthritic hip which may have been secondary to some underlying developmental condition such as Perthe's disease (Plate 8.20). He also had osteoarthritis of the left wrist. There was one young/middle adult with an arthritic hip (Inh 3942).

The acromioclavicular joint of the shoulder was also quite a common site for osteoarthritis in this population. This is one of the regions of the body which is first to exhibit such alterations since it undergoes a minor degree of wear and tear each time the shoulders are raised. The male prevalence rates of 18.8% (acromioclavicular) and 10.2% (hips) reflect the predominance of osteoarthritis in these joints at Cirencester (14.7% and 12.6% respectively). In common with other past populations, arthritic knees are relatively rare (Rogers *et al.* 1981). A study by Heine in 1926 of over 1,000 postmortems revealed more than twice as many cases of osteoarthritis in knees than hips (Collins 1949).

The joints most commonly affected by osteophytosis appear to reflect those with the highest levels of degenerative joint disease in this population (Table 8.36), in addition to the right knee in females.

Spondyloarthropathy: This term covers a group of diseases which are characterized by an erosive form of joint disease, associated with disease of the soft tissues such as the eyes (iritis), skin (psoriasis) or urethra (Reiter's syndrome) and where there is no circulating rheumatoid factor in the blood. Sufferers tend to have the HLA B27 blood type. There were two individuals with probable spondyloarthropathy at Kempston. One mature male (Inh 3948) had fused second and third cervical vertebrae, together with fusion of one right interphalangeal joint and an erosive lesion surrounding the left second metacarpo-phalangeal joint (Plates 8.26 and 8.27). In addition, there was an erosive lesion on the head of the left talus. The other (Inh 3965) had a severely eroded left distal humerus with accompanying lytic lesions on the apophyseal joints of the cervical vertebrae (Plate 8.34).

Enthesopathies: The insertions of tendons and ligaments around the joints respond to the action of muscles by adding new bone under certain circumstances and their study may aid in the investigation of occupational pathology in a cemetery sample. Cortical defects may also be present in areas such as the pectoralis major insertion on the humerus and costoclavicular ligament on the clavicle. However, enthesopathies may have either traumatic, degenerative or metabolic causes so inferences about occupation should be approached with caution.

Joint	Male				Female				Total
	Right	%	Left	%	Right	%	Left	%	No
Acromioclavicular	5/22	22.7	4/26	15.4	4/19	21.0	1/16	6.3	14/83
Gleno-humeral	1/34	2.9	0/35	0	0/23	0	0/19	0	1/111
Elbow	1/40	2.5	1/40	2.5	0/20	0	0/19	0	2/119
Wrist	1/37	2.7	4/40	10.0	1/18	5.6	2/17	11.8	8/112
Hand*	2/41	4.9	3/43	7.0	3/19	15.8	2/18	11.1	10/121
Hip	5/45	11.1	4/43	9.3	1/21	4.8	0/19	0	10/128
Knee	0/40	0	0/38	0	1/20	5.0	0/24	0	1/122
Foot *	2/35	5.7	1/37	2.7	1/25	4.0	1/23	4.3	5/120
Spine - cervical*	2/29	6.9	-	-	5/18	27.8	-	-	7/47
- thoracic*	4/32	12.5	-	-	3/20	15.0	-	-	7/52
- lumbar*	3/40	7.5	-	-	4/21	19.0	-	-	7/61
Costovertebral	2/37	5.4	2/38	5.3	3/18	16.7	3/17	17.6	10/110

* *one or more joints*

Table 8.35 Osteoarthritis - number of joints affected

Joint surface	Male				Female				Total	
	Right	%	Left	%	Right	%	Left	%	No	%
Medial clavicle	4/31	12.9	2/29	6.9	0/22	0	1/19	5.3	7/103	6.8
Lateral clavicle	3/22	13.6	2/26	7.7	2/19	10.5	1/16	6.3	8/85	9.4
Proximal humerus	5/34	14.7	4/35	11.4	0/23	0	1/19	5.3	10/112	8.9
Distal humerus	2/40	5.0	1/40	2.5	2/20	10.0	0/19	0	5/121	4.1
Proximal ulna	1/38	2.6	0/39	0	2/20	10.0	019	0	3/117	2.6
Distal ulna	1/32	3.1	0/37	0	3/15	20.0	1/18	5.6	5/104	4.8
Acetabulum	8/45	17.8	7/44	15.9	6/22	27.2	6/20	30.0	27/133	20.3
Femoral head	5/44	11.3	7/42	16.6	5/22	22.7	4/21	19.0	21/133	15.8
Distal femur	0/40	0	1/38	2.6	5/21	23.8	1/24	4.2	7/129	5.4
Proximal tibia	0/34	0	1/39	2.6	1/22	4.5	1/21	4.8	3/122	2.5
Tarsals	3/35	8.6	2/37	5.4	0/25	0	1/23	4.3	6/125	4.8
Metatarsals	2/35	5.7	1/37	2.7	0/25	0	1/23	4.3	4/125	3.2
Glenoid cavity	4/31	12.9	3/39	7.7	0/20	0	3/21	14.3	10/115	8.7
Ribs	12/37	32.4	10/38	26.3	7/18	38.9	7/17	41.2	36/110	32.7

Table 8.36 Osteophytes - joint surfaces affected

	Male				Female				Total	
	Right	%	Left	%	Right	%	Left	%	No	%
Rotator cuff	8/34	23.5	10/35	28.6	8/23	34.8	8/19	42.1	34/112	30.4
Pectoralis major	5/34	14.7	2/35	5.9	0/23	0	2/19	10.5	9/112	8.0
Teres major	3/34	8.8	4/35	11.4	0/23	0	2/19	10.5	9/112	8.0
Triceps	4/38	10.5	2/39	5.1	1/20	5.0	0/19	0	7/117	6.0
Biceps	4/36	11.1	4/38	10.5	2/17	11.8	1/17	5.9	11/108	10.2
Patellar ligament	11/25	44.0	8/27	29.6	4/17	23.5	3/18	16.7	24/90	26.7
Soleus	3/34	8.8	3/39	7.7	2/22	9.1	3/21	14.2	11/122	9.0
Achilles tendon	11/35	31.4	9/35	25.7	9/24	37.5	6/19	31.6	35/121	28.9

Table 8.37 Enthesopathies: individuals affected

The rotator cuff on the humeral head was the most common site for enthesopathy (Table 8.37). Where all three tendons (subscapularis, supraspinatus and infraspinatus) were involved, the cause is probably degenerative and most females exhibited this kind of change. Nevertheless, in younger males, subscapularis alone was often affected and occupational factors may be important here (Connell, pers comm). It is important for internal rotation of the arm. Enthesopathies of the patellar ligament, particularly in the male right patella (44%) and Achilles tendon were also common. Males tended to have cortical defects at the insertion of pectoralis major on the right humerus. This is one of the muscles which flexes the upper arm.

DISH (diffuse idiopathic skeletal hyperostosis): This condition is characterized by ossification of the anterior longitudinal ligament on the spine and the criteria for diagnosing full-blown DISH are fusion of 4 or more adjacent vertebrae and the presence of extraspinal ligamentous ossification. The disease is largely asymptomatic and is most common in males over the age of 50 years when it may affect up to 10% of a given population. The overall prevalence is around 2.8% (Roberts and Manchester 1995). One elderly male from Kempston (Inh 3988) had fusion of three pairs of thoracic vertebrae (T4&5, T6&7, T10&11) in conjunction with enthesopathies of both patellar ligaments, both Achilles tendons, both rotator cuffs, both biceps and the left triceps insertions and of many pelvic ligaments.

Miscellaneous

Osteochondritis dissecans: An aseptic necrosis affecting part of the articular cartilage and adjacent subchondral bone of a joint may lead to a piece of bone being sloughed off and lying loose in the synovium (joint mouse) where it may eventually be resorbed or reattach to the area whence it came. This process is most often seen on the medial condyle of the distal femur and may be the result of trauma, particularly in the 11 - 18 age group (Wells 1982). Osteochondritis was seen in the distal femora of one male (Inh 3937) and 2 females (Inhs 3903 and 3946). The largest lesion measured 11mm x 7mm Plate 8.6).

Os acromiale: Occasionally the tip of the acromion fails to fuse with the rest of the scapula and retains a fibrous union. This lesion was seen in four right - 7.8% (Inhs 3903, 3961, 3966 and 3679) and four left scapulae - 6.7% (Inhs 3913, 3917, 3952 and 3961), the kind of frequency that might be expected in the population.

Pulmonary hypertrophic osteoarthropathy: A florid subperiosteal deposition of new bone on many of the long bones may be associated with pulmonary conditions such as bronchiectasis (e.g. in modern-day smokers), or congenital cardiac diseases. The periostitis is caused by a slowed venous return due to low oxygen tension in the blood. This kind of picture was evident in the case of Inh 3953, where there was diffuse periostitis of the leg and foot bones, in association with rib lesions indicative of a chronic chest infection.

Discussion

A study of the phasing of burials shows that half of them were carried out during the period from late 2nd to early 4th century AD and during this period the ratio of male to female burials was almost three to one (27M:10F). Three of the younger juvenile inhumations (Inhs. 3910, 3939, and 3973) also date to this phase. Only two women below the age of 35 were interred in the cemetery at this period, as opposed to six women aged over 45 and two between 35 and 45 years. By contrast, there were 13 young men (7 young adult and 6 young/middle adult) and 14 were middle-aged or older (one could only be aged as over 25 years).

During phase 4 (early to mid 4th century AD) the number of males and females is equal (10M:10F); the three adolescents (Inhs 3950, 3968 and 3969), one 5 - 7 year old and one neonatal infant were also interred at this period. Similarly, the late phase (mid 4th - late 4th - early 5th century AD) is demographically normal (10M:9F) with one subadult and one neonate burial. This disparity between the sexes in the later 3rd century, in addition to the large amount of pathology (particularly traumatic lesions) sustained at this period, suggests that the cemetery may have been serving a military community at this time, possibly a group of active and retired auxiliaries, since the legions were more likely to be stationed near the major towns such as Eboracum (York).

Three decapitation burials were carried out during phase 3 (Inhs 3933, 3938 and 3972), three in phase 4 (Inhs 3920, 3951 and 3957) and six in phase 5 (Inhs 3901, 3903, 3905, 3906, 3914, and 3977). The last-mentioned group was peripheral to the cemetery and more likely to be placed inside a ritual enclosure than at other times. There was no particular distribution of sex and age of affected individuals at different periods. Prone burials, however, were most common in phase 4 (early to mid 4th century AD). Seven of the twelve occurred at this period, with two in phase 3 and 3 in phase 5.

Removal of the head before burial has been a feature of funerary rites in some societies since the early part of the Neolithic period, or even the Mesolithic in central Europe (Frayer 1991). A collective burial dating to the Natufian culture in the 11th century BC provided evidence of such a practice in Egypt (Bienert 1991). The preservation and plastering of skulls in Jericho and their retention in the houses suggests ancestor worship and a belief that the source of wisdom resides in the head (Wright 1988), although skulls were also used as fertility charms. Simmer (1982) reported several cases of decapitation and burial of the skull in an unusual location in eastern France during the Merovingian period and commented on 'La vénération du crâne et l'exaltation de la tête a l'époque celtique ...'.

Indeed, the Celts attributed great importance to the cult of the human head, as testified in their literature (e.g. the Mabinogion (Stone 1989) with its legend about Bran who supposedly exhorted his followers to cut off his head and take it to Britain as company for them) and by the display of human skulls or heads in niches at Rochepertuse and Entremont (Cunliffe 1979). Ethnographic parallels for these kinds of beliefs are not hard to find and in some societies, e.g. the Dayak of Borneo, the head is considered to be a trophy (Needham 1976). Hence the custom of removing the heads of enemies conquered in battle, which the Celts also practised. In addition, the removal of part of the corpse is considered to facilitate the entry of the soul into the underworld, by putting an end to the old life and destroying the unity of the body (Wright 1988). By contrast, prone burial is more likely to be designed to prevent the return of certain members of the community to disturb the living.

Decapitation and removal of the skull to a position near the foot of the grave in the Romano-British context appears to be mainly a feature of rural cemeteries (Philpott 1991). Only at Lankhills and Poundbury 3 was this ritual practised in an urban environment and these burials were peripheral to the main cemetery. The six decapitated burials at Cirencester appear to have been the victims of an execution since all but two of them had been decapitated from behind and their heads were in normal alignment (Wells 1982).

The proportion of decapitated burials at Kempston (12/92 or 13%) is higher than the 6.1% calculated by Philpott (1991) as the average for those in cemeteries where this type of burial occurs. At nearby Dunstable 12 of 112 (10.7%) inhumations exhibited this rite. The means by which the procedure had been carried out, namely by a sharp sword or knife usually from the front of the neck (Harman *et al.* 1981, 165), suggest that the victim was either drugged or dead at the time since there was so little damage to the vertebrae (Philpott 1991). Clarke (1979) suggests a position between the third and fourth cervical vertebrae for the Lankhills decapitations; however, such uniformity was only seen in a minority of the Kempston victims and in others the position was more variable, confirming the findings of Harman (Harman *et al.* 1981) at a number of sites in the Thames Valley. McKinley (1993) also reported the discovery of a decapitation burial from Baldock where there were cut marks on the anterior aspect of the axis vertebra. The presence of one decapitated male with his head in the normal place at Kempston is interesting since these burials are much more uncommon than those with the head near the other end of the grave.

Harman also drew attention to the fact that many of the Romano British cemeteries where the rite of decapitation was practised were also those where few children were buried (Harman *et al.* 1981). A similar situation was seen at Kempston, where only 9 discrete burials of infants and children were recovered. They also stressed that few children are accorded the decapitation rite and this was also the situation at Kempston where only one child was decapitated.

Prone burial is found in greater numbers in cemeteries dating to the Romano-British period but in more cemeteries in Anglo-Saxon times. At Castledyke, in the 5th - 6th centuries AD, there were a number of prone burials, some without heads, but no cut marks were found on the vertebrae to indicate the level at which decapitation had taken place. Prone burial is often associated with decapitation and is found at many of the same cemeteries.

The results of stature estimation and metrical analysis revealed that both were very comparable to figures calculated by other authors for cemetery populations dating to the same period. The men were not particularly tall but quite robust and some of the women were quite small by modern standards.

The study of dental disease was notable for the large numbers of cavities in the teeth which had led to many of them being lost prematurely. The Romans imported many species of fruit and vegetables into this country, e.g. plums, apples, cherries, peas, parsnips and carrots; they also practised beekeeping and therefore had access to honey for sweetening food (Scullard 1979), thus providing the medium for caries to form. However, most teeth of children and young adults were healthy, in contrast to the situation in modern times when caries tend to occur most frequently in childhood.

The study of trauma in this relatively small cemetery was characterized by a much larger number and wider range of examples than expected. The relatively large number of injuries to the lower extremity was particularly notable. One fibula was fractured in two places and in another instance both tibia and fibula had been broken, an injury which in current medical practice is normally the result of a car accident (Crawford Adams 1983). Several feet had been traumatized with disruption of the talo-navicular joint or stress fractures of the toe bones and there were numerous crush injuries, mainly to hand or wrist bones, in addition to three depressed fractures on the skull.

Examination of stress indicators produced contradictory results. While there was a rather low rate of enamel hypoplasia, the prevalence of non-specific infection and cribra orbitalia was high. These conditions were far more common than they were at the early Anglo-Saxon cemetery of Castledyke, Barton on Humber. However, two of the three adolescents had enamel hypoplasia and one also had cribra orbitalia. She was evidently a sickly child with a paralysed right arm, abnormalities at the base of the spine and a probable slight scoliosis in addition. Examples of other metabolic diseases included two men with probable healed rickets, one woman with osteomalacia, the adult form of rickets, and two old women with osteoporosis of the spine.

Joint disease was particularly evident in the hips which sometimes occurs in middle- or old age as the result of wear and tear and at others results from an underlying developmental condition or trauma, in which case a hip may become arthritic at an earlier age (Crawford Adams 1971). Examples of both situations were seen at Kempston with at least one elderly man displaying the type of bilateral hypertrophic osteoarthritis described by Rogers *et al.* (1981) as having been quite a common occurrence in the Romano-British and Anglo-Saxon periods but rarely seen nowadays.

In conclusion, the excellent preservation of most burials from this cemetery has facilitated the study of the lifestyle of a small number of Romano-British inhabitants of Kempston who appear to have been subjected to all the trials and tribulations of an early agricultural society, in addition to considerable interpersonal violence and ritual decapitation.

8.2.4 Inhumations North of Church Road

Dispersed Romano-British Inhumations

T A Jackman

Inhumation 2901 (Phase 4, L40)

Infant.
Supine
Preservation: Majority of skeleton represented though fragmentary.
Dental pathology: Post-mortem loss 12/20.

Inhumation 2903 (Phase 3, L68)

Infant.
Crouched
Preservation: Most of the skeleton represented.
Dental pathology: Post-mortem loss 10/20.

Inhumation 2904. Not lifted. (Phase 2, L67)

Inhumation 2905 (Phase 3, L11)

Infant.
Foetal burial
Preservation: Fragments of long bones, skull, vertebrae, feet and hands.
Dental pathology: Left mandibular present with unerupted a, b, c, d and e.

Inhumation 2907 (Phase 3, L10)

Infant.
Disarticulated
Preservation: Approximately half of the skeleton is represented.

Inhumation 2912 (Phase 3, L11)

Infant.
Burial truncated
Preservation: Approximately half of the skeleton present.

Inhumation 2916 (Phase 3, L30)

Skull fragment only

Inhumation 2917 (Phase 3, L30)

Male, older adult.
Disarticulated
Preservation: Skull fragments, rib fragments, right humerus and ulna.
Dental pathology: ante mortem loss 7/32. Post mortem loss 16/25. Caries 1/25. Abscess 1/25. Calculus moderate, periodontal disease severe.

The Saxon Inhumations

Inhumation 2902 (Phase 6, L44)

Female, young adult. Stature 5' 5" (1.63m).
Supine
Preservation: Almost complete skeleton.
General Pathology: The left and right costoclavicular ligaments are stressed and there is lipping around the edge of the patella surface of the right femur and corresponding articular surface of the patella.
Dental pathology: Ante mortem loss 1/32. Post mortem loss 3/31. Periodontal disease and calculus are moderate.

Inhumation 2906 (Phase 6, L44)

Adolescent 15 ± 36 months.
Buried on left side
Preservation: The long bones, skull, ribs and pelvis are present though fragmented. The surfaces of the bones are very eroded.
Dental pathology: The right maxillary '8' is not present and the remaining '8's are unerupted.
All other teeth are present. Calculus and periodontal disease are slight.

Inhumation 2908a (Phase 6, L44)

?Female, adult.
Disarticulated
Preservation: Calva only.

Inhumation 2908b (Phase 6, L44)

Adolescent 9yrs ± 24 months.
Disarticulated
Preservation: Pelvic fragment and several teeth present.

Inhumation 2908c (Phase 6, L44)

Adult.
Disarticulated
Preservation: Fragments of pelvis only.

Inhumation 2909 (Phase 6, L44)

?Female, young adult.
Placed on right side.
Preservation: Most of the skeleton is represented.
Dental pathology: The right side of the mandible and most of the maxilla is missing with the roots of surviving teeth largely decayed post-deposition. Post mortem loss 4/32. Caries 2/28.

nhumation 2910 (Phase 6, L44)

hild 7yrs ± 24 months.
upine.
reservation: The long bones, ribs and pelvis are present though ragmentary.
ental pathology: Post mortem loss 4/20. Upper right and left '3's and eft '6' unerupted; lower right and left '4', '5', '6', '7' and right '3' nerupted.

nhumation 2911 (Phase 6, L44)

Male, adult middle age. Stature 5' 7¾" (1.7m).
Supine
Condition: Almost complete skeleton.
General pathology: Osteophytes around the margins of three fragments of thoracic vertebrae with porosity of the superior vertebral bodies of he spine. The left hand is eburnated on the prong of the scaphoid.
Dental pathology: Ante-mortem loss 2/32. Post-mortem loss 7/30. Caries 2/23. Calculus is moderate.

Inhumation 2913 (Phase 6, L44)

Child 10½- 11½ yrs.
Crouched
Preservation: Most of the skeleton represented.
Dental pathology: Upper right and left '1' and '2' and right '3'. Lower right and left '3', '4', '5' and '6''.

Inhumation 2914 (Phase 6, L44)

Adolescent 15yrs ± 36 months.
Placed on right side
Preservation: Outer surfaces of bones are very eroded.
Dental pathology: All '8's are unerupted. Post mortem loss 3/28. Calculus moderate, periodontal disease slight.

Inhumation 2915 (Phase 6, L44)

Female, young adult. Stature 5' 6½" (1.66m). Platycnemia 77.6 (Eurycnemic).
Supine
Condition: Almost complete skeleton in fairly good condition.
General pathology: Schmorl's nodes on T7 and 8, L2 and 4.
Dental pathology: Ante mortem loss 1/32. Calculus and periodontal disease are slight. Odontome present within the maxilla.

Discussion

Eighteen inhumations were revealed during the first seasons excavations at Kempston, of these Inh 2904 was not lifted. Analysis shows that they belong to two distinct periods and that they should therefore be seen within the wider picture of burials at Kempston.

The preservation of the skeletons is fairly good but with most of the bones fragmented. Just under half of the material had suffered from erosion of the cortical surfaces. Only three of the inhumations are almost complete, the remainder have half the skeleton present or less.

Children are well represented from Romano-British period, less so from the Saxon cemetery. Five of the inhumations (Inhs 2901, 2903, 2905, 2907 and 2912) are infants with Inh 2905 and Inh 2912 aged seven months *in utero* ± 2 months. Three children have been identified: Inh 2910 aged 7 years ±24 months, Inh 2908b aged 9 years ±24 months, Inh 2913 aged 10½-11½ years. The two adolescents present in this group are Inh 2906 and Inh 2914 aged 15 years ± 36 months. The adults have been grouped as young adult, adult middle aged and older adult. The young adult category, 20-35 years, include Inh 2902, Inh 2990 and Inh 2915, while Inh 2911 is an adult middle age, 35-45 years. Inh 2917 is an older adult, 45 years plus. There are three adults which are of unspecified age; Inh 2904, Inh 2908a and Inh 2908c. Ageing is based on tooth eruption, epiphyseal fusion and length of the long bones for the sub-adults (Ubelaker 1989) and dental attrition (Brothwell 1981) together with the degree of general degeneration present for the adults. The sexing of adults is not always possible. This is because the skeleton is incomplete or fragmented or the criteria for a conclusion are borderline. In these cases the individual is marked as ?, ?Female or ?Male. (Sub-adults cannot be sexed due to the skeleton not being fully developed until post-puberty). Sexing has been achieved using morphological (cranium, pelvis) and metrical (femoral and humeral heads, clavicular length) criteria (Krogman 1962; Stewart 1979). Due to the relatively high number of sub-adults, 10 individuals could not be sexed and Inh 2904 has not been sexed because it was unexcavated. The remainder can be broken down to two males, two females, two ? females and one ?

Three of the adults are complete enough to calculate stature using the formula described by Trotter (1970) for white American populations. Inh 2902 is a young adult female and measures 5'5" (1.63m). Inh 2915, also a young adult female, measures 5'6½" (1.66m). The only male to be measured, Inh 2911, is 5'7 ¾" (1.70m).

From the 16 skeletons recorded, 13 have teeth from complete or incomplete jaws or found loose with the burial. A total of 212 teeth was recovered. Five of these are carious and come from Inh 2909, Inh 2911 and Inh 2916. There is slight or moderate calculus (or tartar) present on teeth from Inh 2902, Inh 2906, Inh 2911, Inh 2914, Inh 2915 and Inh 2916. Periodontal disease, again only slight or moderate in severity, is found on Inh 2902, Inh 2906, Inh 2914, Inh 2915 and Inh 2916. This inflammatory disease of the periodontal tissues results in gradual loss of the supporting membrane and bone around the roots of the teeth. If left unchecked, the teeth eventually fall out. Two jaws, Inh 2908b and Inh 2910, have mixed dentition (deciduous and permanent).

There are two skeletons, Inh 2902 and Inh 2915, for which metrical indices have been calculated (Brothwell 1981). Platymeria shows the amount of antero-posterior flattening of the femur and may be due to mechanical adaptation to stresses on the bone, calcium or vitamin deficiency in response to loss of bone material. Platycnemia shows the amount of transverse flattening of the tibia shaft. The reasons for this remain doubtful.