APPENDIX 1

The Human Bone

By Sharon Clough and Kate Brayne

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1 THE SKELETAL ASSEMBLAGE

1.1 The Sample

The skeletal assemblage from the site at London Road, Gloucester consisted of at least 56 inhumation burials (17 excavated by Gloucester Archaeological Unit in 1993 during an archaeological evaluation of the site, and 39 excavated by Foundations Archaeology in 2002 during a full scale excavation), some disarticulated remains and 19 cremation burials (which comprised 20 individuals). Few of the inhumations were complete, and differing proportions of the various skeletons were recovered. At the time of writing it is believed that the cemetery is Romano-British in date, with some graves from the 1st and 2nd century AD through to the 4th century. The majority of inhumations were orientated north-south, and some grave goods were recovered, which suggests that this was a Pagan burial site.

1.2 Preservation

The skeletons varied in their state of preservation, from poor through to good, this was probably due to the burial environment and later building activity on the site. There was evidence for post mortem damage to the bones in some cases.

2 OSTEOLOGY

2.1 Recording

Each skeleton was laid out individually with the bones in anatomical position in order to be studied. Information was recorded on a purpose-built Microsoft Access database. Each individual was assessed for sex, age, stature, pathology and morphological anomalies.

For the ease of analysis the two assemblages have been looked at together and their context numbers used for identification. Only one number is duplicated (116) and this is both a cremation and an inhumation, so confusion will not occur.

The two assemblages are treated as one entity, and not compared and contrasted in this analysis. This is because it is understood that the 13/93 skeletal assemblage is a subset of the cemetery population, as it derives from evaluation trenches within the area of the cemetery represented by the LRG02 assemblage, which itself derives from a large scale excavation. Therefore it is not thought that the 13/93 skeletons represent a discrete sample, distinct from the LRG02 skeletons, and therefore a comparison between the two groups would not be meaningful.

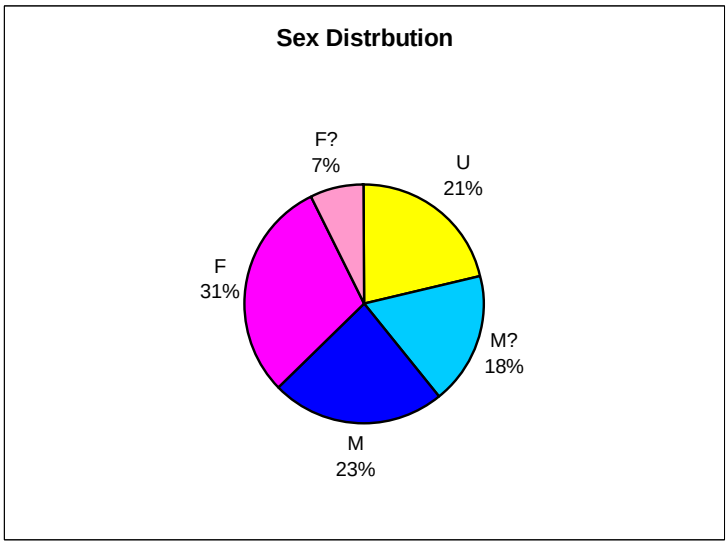
2.2 Determination of Sex

The sex of individual skeletons was assigned according to morphological criteria: in particular by assessing features of the pelvis and skull, which display the most sexual dimorphism in humans. Where both morphological characteristics and measurements were diagnostic, a firm sex was assigned to an individual. If morphology and metrics were ambiguous, a tentative assignment was given according to the relative proportion of characteristics of either sex. In some cases insufficient sexually

dimorphic features were preserved to assign a firm sex to an individual, in which case a tentative assignment was given where possible.

No attempt was made to assign sex to juveniles, as secondary sexual characteristics do not manifest themselves until puberty (Bass, 1987:19) and are not fully expressed until young adulthood. Additionally, some skeletons were incomplete in the diagnostic areas. The sex of the individuals in these categories has been described as "undetermined"

The following chart indicates the ratio of each sex within this assemblage:



These results show that there is an approximately even distribution between males and females, which indicates that burial within this cemetery was not determined by sex.

In general, Roman cemeteries have shown a bias towards males, who are often over represented by a matter of a few percentage points. It is hypothesised that this reflects the practice of infanticide of babies younger than about 6 months (before they had cut their first teeth), which was particularly practised on girls. There is both documentary and osteological evidence of this practice. Because this assemblage has a moderately high proportion of individuals of undetermined sex, it is not possible to assess the exact ratio of males to females, but from the individuals for whom it was possible to determine sex, it does appear that there is a slightly higher proportion of males represented, which may reflect this general trend.

2.3 Estimation of Age at Death

A variety of criteria were employed to assign age-at-death to individuals. Wherever possible, age was estimated using a combination of factors, in order to minimize inaccuracy. As a general rule, the younger an individual was at death, the more possible it is to assign a precise age. Senile adults are particularly difficult to age with any precision, and it is probable that, in general, aged individuals are consistently underaged in osteological reports.

The accuracy of adult age estimation depends largely on the completeness and extent of preservation of the individual skeleton. The dentition is often the best preserved feature. Lovejoy's Attritional Ageing Scheme was utilized, which assesses the attrition of the entire dental arcade, which enables the most accurate age estimate to be made.

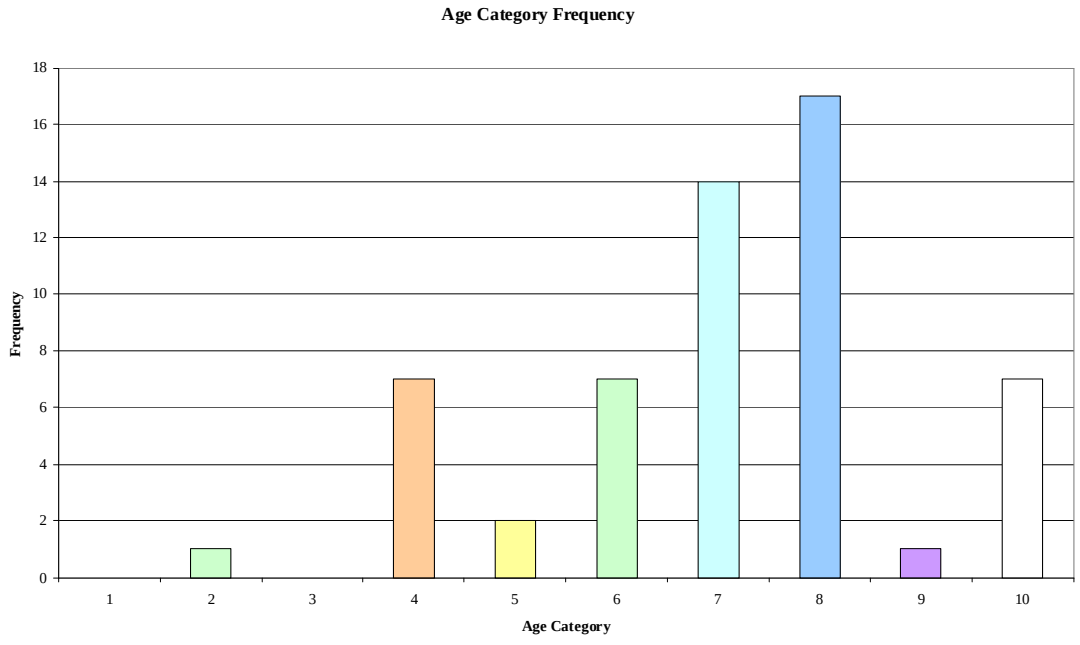
The extent of cranial suture fusion has been used as a means of aging adults (Meindl and Lovejoy, 1985), but the technique has been criticised as there is considerable variation between individuals. However, owing to the poor preservation of this assemblage it is necessary to utilize any means possible to extract information, and therefore cranial suture fusion has been recorded where it is visible and used as a means of indicating age.

An age estimate was assigned to each individual. However, for some individuals there was a limited availability of age related features, and these estimates must be regarded as approximate.

Age categories

1 Foetus	9-40 weeks in utero
2 Neonate	0-1 month
3 Infant	1 month - 1 year
4 Juvenile	Epiphyses unfused
5 Subadult	Permanent dentition incomplete/some epiphyses fused
6 Young adult	17-25 years
7 Middle adult	26-45 years
8 Mature adult	46+ years
9 Senile adult	probably 60+ years
10 Indeterminate adult	Epiphyses fully fused but insufficient material for accurate aging.

The following graph indicates the life table for this population:



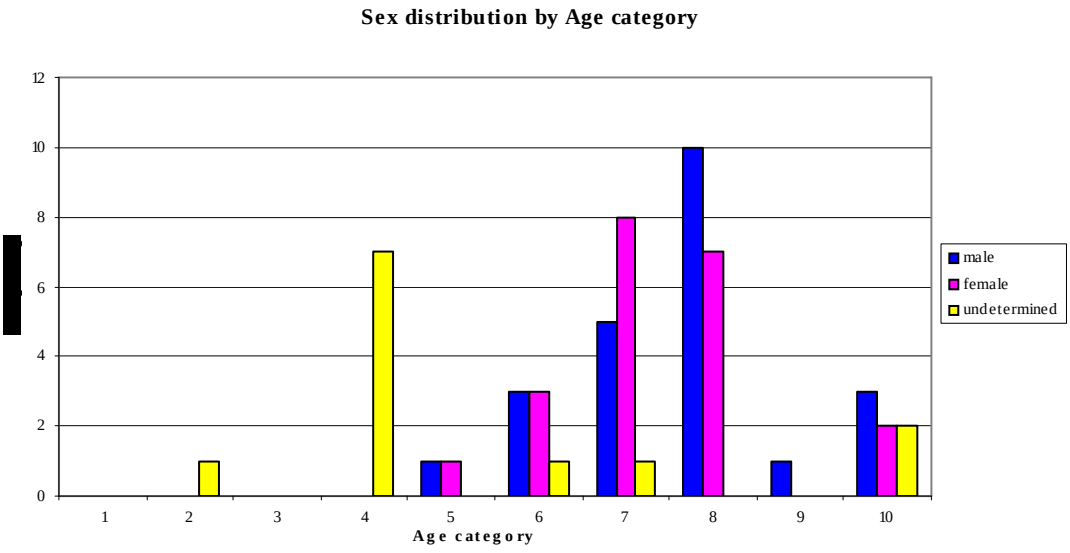
From these results it is possible to see that a large portion of the individuals are aged middle adult and above. It is quite noticeable that there is only one infant under the age of 1 year old. This may be because:

- Infants were treated differently (for example buried elsewhere);
- Infant bones did not survive in this soil; or
- Infant burials were overlooked during excavation.

It is quite common for there to be few infants and juveniles excavated from archaeological contexts as their bones often do not survive well in the burial environment and they look different to adult bones, and are therefore not identified as human. Therefore they may suffer from poor recovery rates. However, in this case the bones of the one infant were very well preserved, which may indicate that infants were not usually buried in this cemetery (or at least in the excavated part of the cemetery)

A high portion of the individuals from this population survived into mature adulthood and older. Due to current aging techniques it is not possible to age accurately over about 55 years and so some individuals may have been underaged. The bones of aged individuals often are affected by reduced mineralization and density, which affects preservation. Therefore, the age diagnostic parts of the skeleton may not have survived, which will also affect the capacity to accurately estimate age.

The following graph shows how the sex of the individual may have some bearing on the age attained before death.



The graph indicates that within this population males were living longer than females, with more of them attaining mature adulthood and senile adulthood (60+). However, owing to the limitations of aging techniques, accurately estimating age at death of adults older than about 55 years is unreliable. In the study done on individuals of known age-at-death in the Spitalfields Crypt collection by Margaret Cox *et al*, adults were consistently under-aged by standard osteological techniques. Therefore, it is likely that elderly females and males in this assemblage were under-aged and placed in the Age 8 category, (age 55+, with the upper limit of the age unknown), whereas in

fact they should be within Age Category 9 (60+, with a strong possibility of being considerably older than this). As elderly females tend to be particularly prone to osteoporosis (lack of bone density and poor mineralization), which affects the preservation of bone, it may be that lack of evidence has resulted in female skeletons being particularly prone to being under-aged, and therefore the graph may be slightly misleading, and it may be that the cemetery population actually represents a more even number of males and females through all age categories.

However, if aging is accurate then the graph shows males and females are evenly represented in the younger age categories. It is unclear why females were dying at a younger age than males in this population. Possible explanations include:

- Women were dying in childbirth or shortly afterwards;
- Women had unequal access to food or other resources, and therefore had compromised immune systems, and were less able to survive infections.

It does however seem that there is a high proportion of mature and elderly males buried in this cemetery.

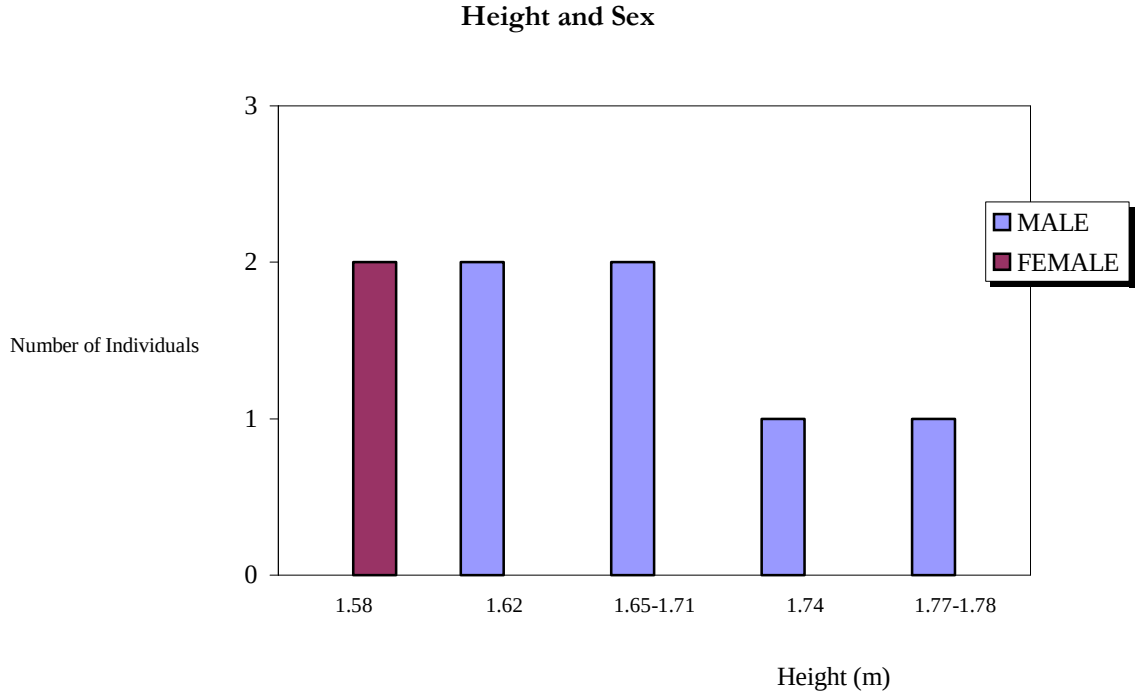
2.4 Estimation of Stature

The living stature of individuals can be estimated by taking measurements of the maximum length of the long bones, then applying these to the formulae calculated by Trotter and Gleeser (1952).

There are some limitations to this technique. The epiphyses of the long bones must be fused, eliminating the possibility of estimating the stature of subadults. Long bone epiphyses begin to fuse at around 16 years (Brothwell, 1981), and after this age stature estimates are feasible. In order to make an accurate estimate of stature as many long bones as possible must be measured, as an accurate stature estimate can be made from a single bone. Incomplete bones cannot be used.

If the number of bones recovered, or their condition, was inadequate, the individual's stature was recorded as "insufficient data". Owing to the margin of error inherent in stature, all estimates are made to the nearest centimetre or half inch.

The results for those individuals from which it was possible to estimate stature are given below:



It was not possible to gain many stature estimates from the skeleton assemblage due to the poor condition of many of the long bones. However, as is apparent from the graph, of those it was possible to assess, the height ranged from 1.58m to 1.78m (5'2" – 5'8"). Only two female heights were ascertained and they are in the lowest range at 1.58m.

From these results it is possible to say that the females were shorter in stature than the males, which would be anticipated in a normal population.

3 PATHOLOGY

Before discussing the pathological conditions displayed among the LRG 02 and 13/93 skeletal assemblages it is cautionary to note the limitations of palaeopathological diagnosis. The vast majority of pathologies which afflict the human body do not affect the bones. In other words, many conditions which were present in the population will not be visible palaeopathologically at all. Additionally, many of the conditions which can affect the bones do not do so in all cases (this is discussed later regarding individual pathologies). Therefore, in any skeletal assemblage, the prevalence of a condition in terms of skeletal manifestation may not represent the *in vivo* prevalence in the population.

In any one skeleton it is impossible to tell how long the individual had a pathological condition, or at what stage of that condition the individual died (Rogers and Waldron, 1995). Indeed, it is not possible to state categorically that an individual died as a direct consequence of any pathological condition they display. With the exception of certain traumatic events, the cause of death can never be established in an archaeological skeleton from the bones alone. Additionally, caution should be exercised when describing a condition as 'severe', as there is no means of knowing from the bones how much pain or inconvenience an individual suffered from any pathology during life.

The following pathological conditions were found in the skeletal assemblages:

3.1 JOINT DISEASE

Joint disease comprises most of the evidence for pathology in skeletal assemblages (Roberts and Manchester, 1995). In modern society it appears to be an almost inevitable feature of age-related degenerative change. In America, it has been estimated that up to 85% of the population over the age of 45 are afflicted by joint disease (Cotran et al, 1989).

3.1.1 Osteoarthritis

Osteoarthritis is the most common of all joint diseases in modern and historical populations. It affects the synovial joints and its frequency increases with age. The changes that occur round the joint are the reaction to and attempts to repair joint failure. There are many elements that will predispose one to this failure; for example age, genetic predisposition and frequency of use in life. The most frequent change seen around the joint on dry bone is osteophytes. These can be a thin or thick, irregular bone fringe around the margins of the joint. The joint surface can also develop osteophytes. Other lesions which can occur on the joint surface are small pits, or porous regions . The bony contour of the joint may be altered. However, the diagnostic lesion of osteoarthritis is known as eburnation. This is an area of polishing on the joint surface caused by total degradation of the cartilage and the friction upon each other of the bony surface (Rogers 2000), so that the bone surface resembles ivory.

Five individuals presented with evidence for osteoarthritis:

Skeleton No.	Sex	Age	Description
SK 86	Undetermined	Adult	The right 1st metacarpal and phalanx had eburnation on the lateral side where they articulate. See Plates 6
SK 4056	Male	50 -60	The right 1st rib on the sternal end has osteophytic activity with a deep cavity. The left humerus has osteophytes below the deltoid tuberosity, the left glenoid fossa on the scapula also has these changes
SK4015	Male	60+	The left scapula glenoid fossa has slight osteophytes developing around the rim. Two ribs have eburnation and osteophytes, the left ulna distal end has become misshapen and has eburnation, the left radius distal end, ulna notch has eburnation and osteophytes along the rim of the articulating surface. *See Plates 4 and 5*.
SK 1084	Male	40 - 50	The degenerative change for this individual was possibly a direct consequence of the fracture injury sustained to the right distal ulna. The right ulna head presented with slight osteophytes deepening the coronoid process. The right radial head had eburnation on the articulating surface, corresponding to this the humerus lateral epicondyle also shows eburnation. The left and right scapulae in the glenoid fossa have small osteophytes developing around the rim. *See Plates 2 and 3*
SK 720:	Male	50+	The right 1st metatarsal has eburnation on the posterior (or plantar) surface of the head's medial ridge. This was possibly due to the sesmoid bones (which normally ride in the grooves between the two ridges and ossify between the age of 8 and 14) having moved when the cartilage wore away, so that the sesmoid bone and metatarsal were in direct contact, thus creating friction which led to the eburnation and flattening of the ridge in that area. *See Plate 1*.

3.1.2 Degenerative Disc Disease

This is a separate entity from osteoarthritis, which occurs at the apophyseal joints of the vertebrae. Degenerative disc disease has an almost universal prevalence among aging individuals: it is a consequence of the recurrent stresses put on the spine during everyday activity. Bony changes occur when the gelatinous internal *nucleus pulposus* of the intervertebral disc bulges out of its fibrous capsule, the *annulus fibrosus* (Roberts and Manchester, 1995). Colloquially this condition is called a 'slipped disc'. It causes growth of bone around the anterior margins of the vertebrae (osteophytes), roughening and porosity of the end plates of the vertebral body, and indentations known as Schmorl's Nodes on the vertebral end plates (Rogers and Waldron, 1995). Individuals that display these bone changes may have experienced stiffness, lack of flexibility, and possibly pain.

Ten individuals presented with some level of degenerative disc disease. These are as follows:

Skeleton No.	Sex	Age	Description
SK 100	Female	55+	Cervical vertebrae had eburnation, porosity and osteophytes.
SK 526	Female	30-40	7 Cervical Vertebrae upper and lower bodies have severe pitting and porosity and osteophytes. See Plates 7 & 8
SK 720	Male	50+	2nd Cervical Vertebrae R articulating facet has osteophytes, 3 & 4 cervical are very osteophytic and porous.
SK 1023	Female	30-40	Cervical vertebrae 3,4,5 have eburnation on the L articulating facets and osteophtyes on the R. Body of C5 is porous and has osteophytes
SK 1084	Male	40-50	Lower thoracics have osteophytes on the articulating surfaces. Lumbar bodies osteophytic lipping, with 1 having vertical compression on one side.
SK 4009	Male?	43-55	T7-L5 osteophytes on edges of bodies. 2 spinous parts of the vertebrae had osteophytic growth where articular surfaces meet
SK 4012	Male	40-50	T7-L5 slight osteophytes. T6 & T7 have flattened facets with eburnation
SK 4015	Male	60+	From C1-L4 there are osteophytes and eburnation See Plate 9
SK 4036	Female	50+	L1-4 osteophytes on edge of bodies. 3 thoracic vertebrae have severe osteophytes.
SK 4056	Male	50-60	From cervical to Lumbar vertebrae there are osteophytes.

All these individuals are of the older age group (40+), which is consistent with the degenerative nature of this disease. Two individuals had some osteophytic changes along the entire length of the spine (4015 and 4056) and four individuals had the changes only in the cervical (neck) region. As the latter four individuals, three were female and in the lower age range, it may be possible to suggest occupational stress as the cause of the osteophytic changes. It has been suggested (Larsen 1997) that the cause of this is the carrying of heavy loads on the head. Individuals in traditional agricultural communities and from lower socioeconomic groups from urban settings in South Asia habitually carry loads on their heads. These loads include laundry bundles, water jars, firewood and dirt-filled containers at construction sites. This behavior has been clinically studied and confirms that it leaves the cervical spine susceptible to injury and cumulative degeneration. The greater severity of osteoarthritis in the cervical spine of women than men suggests the practice was gender specific, for example the Romano-British Bath Gate population from Cirencester (Lovell 1994).

3.1.3 Schmorl's Nodes

These are indentations on the upper and lower surfaces of the vertebral bodies, caused by herniation of the intervertebral disc contents through the vertebral end plates. They are often associated with osteophytosis and degeneration of the vertebral discs (Roberts and Manchester 1995). They are most commonly found in the lumbar and thoracic regions of the vertebrae.

Thirteen individuals presented with Schmorl's nodes in the spine. These are as follows:

Skeleton No.	Sex	Age
SK 74	Male	28-30
SK 100	Female	55+
SK 113	Female	24-30
SK 604	Male	20-25
SK 659	Female	20-25
SK 1023	Female	30-40
SK 3035	Female	30-40
SK 4009	Male?	43-55
SK 4012	Male	40-50
SK 4015	Male	60+
SK 4036	Female	50
SK 4053	Male?	20-23
SK 4072	Female	20-25

There is a greater age spread for Schmorl's nodes than degenerative disc disease. It is possible to damage the spine at any age and this is reflected in this population. There is an even spread between males and females and so it is not a gender specific problem, and therefore possible not related to any particular activity.

See plate 10.

3.2 TRAUMA

Trauma can be defined as any bodily injury or wound (Roberts and Manchester, 1995). Fractured bones are one of the most common pathological conditions found in skeletal assemblages. Although it is possible to identify at what stage in the healing process of any fractured bone an individual died, if a bone is fully healed, it is not possible to determine how long *ante mortem* the fracture was sustained.
There are three major causes of fractures: acute injury (in the form of accidental injury or intentional violence), underlying disease (in which case a fracture is termed 'pathological'), and repeated stress (Roberts and Manchester, 1995).
Infection is a serious complication of fracture and can occur whenever infectious bacteria become associated with a fracture site (Ortner and Putschar, 1981). For example, in the case of an open or 'compound' fracture the broken bone comes in contact with the skin, and this has a great risk of infection. An infected fracture site can lead to septicaemia and ultimately to death.

3.2.1 Fractures

Seven skeletons presented with evidence for possible fracture injuries, involving a total of twelve bones. These are as follows:

Skeleton No.	Sex	Age	Fracture
SK 74	Male	28-30	3 Ribs
SK 1084	Male	40-50	Right Ulna. See Plates 2 and 3
SK 3035	Female	30-40	Left Rib and Left Proximal Phalanx (hand)
SK 4015	Male	60+	Sternum/Manubrium
SK 4021	Female	40-50	Left Tibia
SK 4053	Male?	20-23	Left Humerus. *See Plate 14*
SK 4063	Male	50-60	Right Tibia, rib and spondylosis of 5th lumbar vertebrae *See Plate 12*

The majority of these fractures have healed completely and most have aligned fairly straight. This indicates that the fractured bones were splinted soon after the trauma occurred. Therefore we can hypothesise that there were individuals within this community with some knowledge of medicine. On SK 4063 the 5th lumbar vertebrae has not healed due to the nature of the fracture. Spondylosis is possibly caused by a congenital weakness of the bone between the upper and lower joint surfaces on the neural arch. Recurrent stresses and strains of bending and lifting and twisting (eg. paddling canoes or shoveling) in the upright posture create a gradual series of small fractures at the site of weakness. Ultimately the neural arch separates from the vertebral body, remaining attached by ligaments and fibrous tissue. Continual stresses at this site ensures that the fracture never heals and in the case of SK 4063 eburnation between the fractured surfaces suggests they were rubbing together during movement. Modern incidence of this fracture is around 3% of Caucasian populations, though certain activities (gymnastics for example) will raise the incidence. The individual would most likely not have known of the condition and felt only lower back ache and discomfort. See Plate 12.

The injury incurred by SK 4015 at the joint of the sternum and manubrium was not necessarily a fracture, although it appears to derive from some kind of trauma, which resulted in an angulated alignment of the two bones. (See Plate 13)

Only one fracture (SK 4063, right tibia) is caused by an underlying pathology, which is discussed further in the document.

3.2.2 Osteochondritis Dissecans

This lesion is a result of fragmentation and probable disruption of the articular cartilage, probably consequent upon trauma. The result is a defect in subchondral bone which is generally in line with the long axis of the joint surface. It has a peak age of onset between 15 and 20, and is more common in males than females. The knee is affected in 80% of cases (Roberts and Manchester 1997). There are defects in the joints which may be mistakenly attributed to osteochondritis dissecans and therefore any diagnosis is tentative.

There is one probable case of osteochondrtitis dissecans on the left medial condyle of the femur of SK 1035, with other damage evident on the right condyle.

See Plate 15.

3.2.3 Other Trauma

SK 4056 presented with right 3rd and 4th metatarsals (foot bones) that were almost joined by a large exotoses (bony projection) extending from the 4th to the 3rd metatarsal. The 3rd metatarsal has an articulating surface on the superior side where the osteophyte would have sat. The 4th metatarsal appeared to be placed more medially than would be considered normal. It is possible that this was an injury which resulted in joint disease. Alternatively, repeated strain in an unusual manner on the joint between these two metatarsals resulted in new bone growth to stabilise the joint.

See Plate 11

3.3 INFECTIOUS DISEASE

3.3.1 Non-Specific Infections – Periostitis

Periostitis is surface inflammation of the bone manifesting itself as fine pitting, longitudinal striation and sequentially, plaque-like formation on the original cortical surface. The tibia is most commonly involved as it lies close to the skin surface and is subject to recurrent minor shin trauma. Other causes such as varicose veins, venous stasis and ulceration of the lower leg may lead to low level inflammation, though there is doubt as to whether this would cause periostitis. It has been suggested that tibial periostitis is evidence of a general stress throughout the skeleton.

Four skeletons presented with lesions typical of periostitis:

Skeleton No	Sex	Age
SK 74	Male	28 - 30
SK 180	Male?	25 - 35
SK 1084	Male	40 - 50
SK 3041	Male	25 - 30

See Plate 16.

3.4 METABOLIC DISEASE

3.4.1 Cribra Orbitalia

Iron deficiency anaemia presents itself as cribra orbitalia, or pitting and porosity in the eye sockets. This can be caused by lack of iron in the diet or by a variety of non-dietary factors such as blood loss, chronic diarrhoea, parasitic infections, disease and genetic disease. Symptoms include fatigue, pallor, shortness of breath and palpitations. The bone changes probably only occur in childhood, although the lesions can persist into adulthood (Roberts and Manchester 1997).

Five skeletons presented with lesions typical of cribra orbitalia:

Skeleton No	Sex	Age
SK 604	Male?	20 - 25
SK 4021	Female	40 - 50
SK 4039	Male?	55+
SK 4053	Male?	20 - 23
SK 4058	?	7 - 9

See Plate 17.

3.4.2 Rickets

It has been suggested that skeleton number 108, a juvenile, was suffering from rickets (vitamin D deficiency). The skeleton was examined and there was no evidence for the typical ‘bowing’ of the femur and other long bones associated with this metabolic disease.

3.5 MUSCULO-SKELETAL STRESS MARKERS

Stress markers on bone are found on muscle attachment sites where there is high mechanical stress. Increased loading on bone will cause increased new bone deposition, and tension on the bone will lead to resorption. Enthesophytes are areas where new bone formation is present at tendinous and ligamentous insertions, as a result of increase in the size of the associated muscles. The patella (on the knee cap) and the insertion site of the achilles tendon (on the heel) are sites where such enthesophytes may often be identified.

It is debatable as to whether evidence of particular muscle use can identify occupation or whether differences in the left and right sides indicate left and right-handedness. It is however interesting to note that in this population there were several areas where the muscles and tendons have suffered 'stress'.

Thirteen of the skeletons presented with stress markers:

Skeleton No.	*Age*	Sex	Description
SK 77	24-25	Undetermined	Left clavicle, medial inferior surface pit.
SK 180	25-35	Male?	Exotosis on the left femur, damage to Gluteuii?
SK 604	20-25	Male?	Left 1st metatarsal proximal articular surface has a small lesion and where it articulates with 1st cuneiform is a small raised area. The first phalanx also has a small lesion.
SK 659	20-25	Female	Right humerus is 7mm longer than left. Right Clavicle is longer also. Exotosis on the right femur and a small groove on the left patella.
SK 720	50+	Male	Right ulna olecranon process on the posterior has exotosis , muscular damage?
SK 1023	30-40	Female	Right 4th&5th metatarsals articulating unusually.
SK 4009	43-55	Male?	Left humerus deltoid tuberosity prominent. Left handed?
SK 4012	40-50	Male	Right tibia exotosis near proximal fibular facet. Left calcaneus posterior surface strained tendon. Right humerus prominent insertion for pec major and deltoidus. Right clavicle acrominon end is flattened and inferior side of sternal end has prominent muscle attachment site. Large nuchal crest. See Plates 18 & 19.
SK 4036	50+	Female	Patellae striated anterior surface, strained tendons?
SK 4044	40-50	Female	Right tibia has ridges for muscle attachments.
SK 4053	20-23	Male?	Right clavicle thicker and more prominent muscle attachments than left, due to left arm fracture? Used right more?
SK 4056	50-60	Male	Left humerus strong muscle attachments. Left handed?
SK 4072	20-25	Female	Right ulna styloid process does not protrude, same level as head.

Male skeletons in general have more marked muscle attachments than female. However, those skeletons in the table above display more prominent muscle attachments than would be considered 'normal'. One case appears to be a direct adaptation due to injury (SK 4053), and others may show a left or right handed preference (SK 4056, SK 4009), though this may be occupationally related. SK 4012 has a very prominent nuchal crest (on the back of the skull), which is pointed and stands away from the skull at least 15mm. Though usually more prominent in males, this is an extreme example and probably caused by rigorous use or strain of the ligament. This individual was generally well built and used his muscles strenuously. It

has been suggested that to gain such a prominent crest could be caused by wearing a heavy helmet over long periods of time, perhaps indicating that this person was a retired soldier?

See Plates 18 and 19.

3.6 OTHER PATHOLOGIES

3.6.1 Cleft Neural Arch

SK 74 has a minor congenital defect of the sacrum. In more severe cases it is known as 'spina bifida', though in this case it is a cleft of the 1st sacral spine. It is an inherited condition and would have had little to no effect on the individual's health.

See Plate 20.

3.6.2 Osteosarcoma

SK 4063 had pathology on the right knee (proximal tibia, lateral condyle), which has been interpreted as an osteosarcoma (cancer) by an orthopaedic surgeon at Southampton General Hospital, with a secondary pathological fracture.

Before the age of 55 cancer is relatively uncommon, over this age, incidence increases at an exponential rate. SK 4063 is 50-60 year old male and so fits into this trend. The reduced mechanical strength of the bone at the site of the osteosarcoma caused a fracture posteriorly of the right tibial condyle. It is only the lateral condyle which is affected by the disease and fracture, and there is little evidence on other bones for any problem.

See Plate 21.

3.7 NON-METRIC TRAITS

Non metric traits are non-pathological bone abnormalities that cannot be measured metrically. Some observers have suggested that the presence of non-metric traits can indicate genetic relationships in a population. However, there is not a clear-cut relationship between kinship and presence of non-metric traits.

3.7.1 Retention of the Metopic Suture

The metopic suture is usually fully fused by the time an individual is two years old. The persistence of the medio-frontal suture is a non-metric trait, which has no ill effects on the individual. It has been suggested that there is a degree of genetic control for this variant, it tended to 'run in families' (Mays 1998).

Three individuals presented with a retained metopic suture:

Skeleton No	Sex	Age
SK 92	Male	30+
SK 678	Female	18 - 20
SK 3041	Male	25 - 30

It is not possible to say whether these individuals had any degree of kinship due to lack of cemetery layout data.

See Plate 22.

3.7.2 Auditory Torus

There is a supposed correlation between auditory exotoses (bone growths in the ears) and immersion in cold water over a long period of time. The bone develops due to the repeated trauma of cold water in the ear canal. Activities such as sponge fishing, which involves going into the water, have been observed to result in higher frequencies of auditory tori. In extreme cases the tori would cause deafness as the auditory meatus becomes blocked by bone.

SK 720 has nodules or auditory tori in both the left and right ears (acoustic auditory meatus).

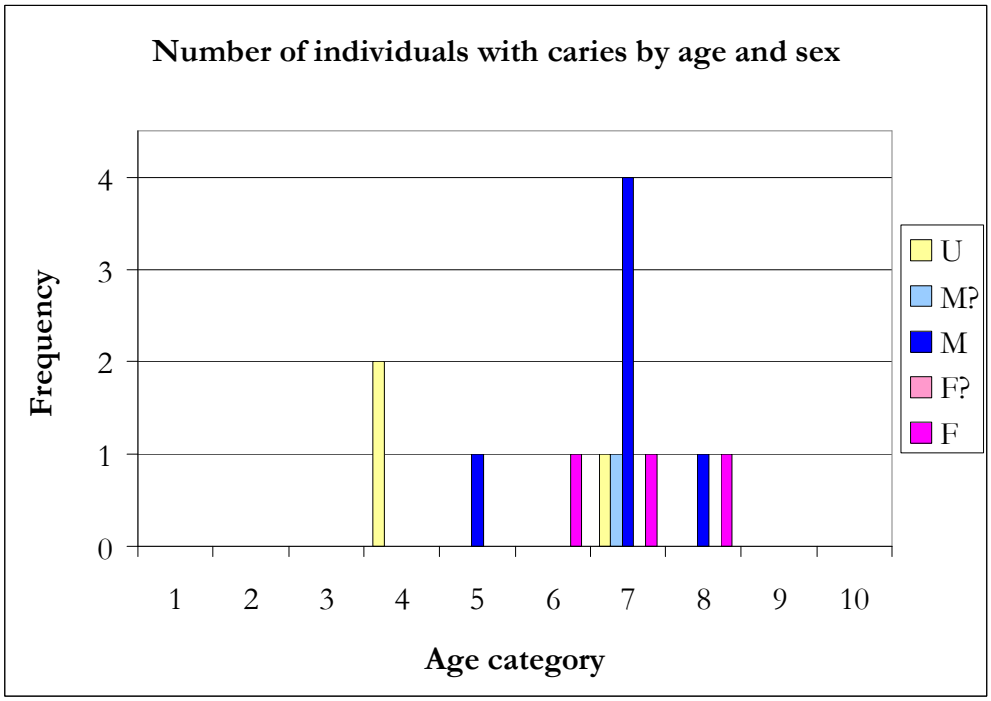
See Plate 23.

4 DENTAL PATHOLOGY

4.1 Caries

Caries (also known as 'tooth decay') are caused by bacteria in the mouth metabolizing sugars, resulting in the production of an acid, which causes the demineralization of tooth enamel (Craig, pers. comm.), and eventual production of cavities in the tooth. The two most significant factors in the presence of caries are consumption of sugar combined with inadequate dental hygiene. Caries are almost universal amongst human societies where the diet contains high quantities of sugar (including honey).

Thirteen individuals presented with caries. There were a total 27 active caries at the time of death, with many teeth at the root only stage or which had been lost antemortem.



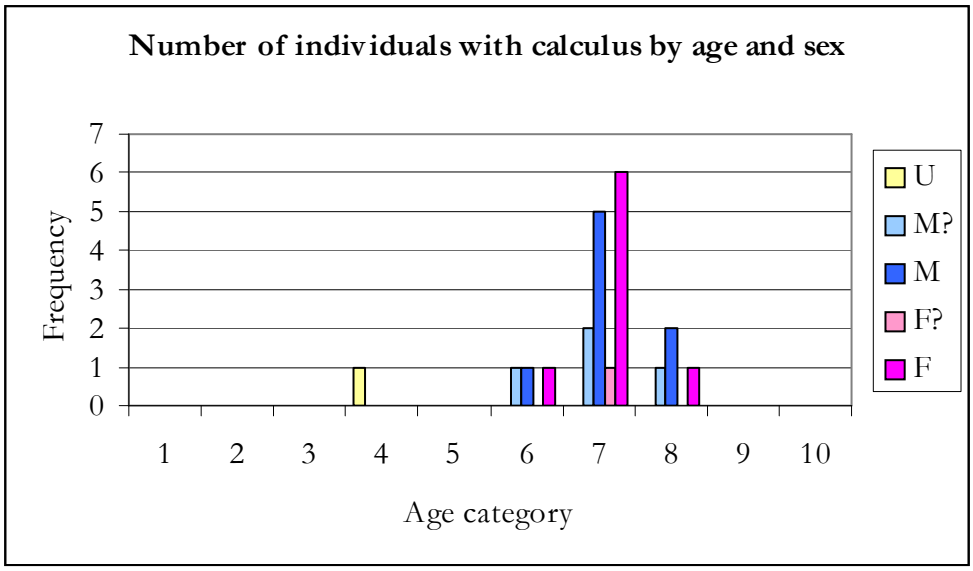
Caries are distributed across all age groups and both sexes, although there is a peak in caries among males aged 26-45. However, this may reflect the fact that many of the older adults had already lost teeth affected by caries *ante mortem*. In general, Roman skeletons tend to present with fairly high levels of caries, which is interpreted as evidence for a diet which was high in sugars. Roman medical texts indicate that honey was believed to be a cure for tooth ache, and was applied to areas of tooth decay!

4.2 Calculus

Calculus is an accumulation of mineralised bacterial plaque on the teeth when oral hygiene is inadequate. It occurs with two distinct forms of distribution. *Supragingival* calculus is located around the gingival margin on the necks of the teeth, and is preferentially deposited in relation to the openings into the mouth of certain major salivary gland ducts. On the other hand, *subgingival* calculus is located below

the level of the gingival margin, and its distribution and extent correlates well with the presence and severity of inflammatory periodontal disease, which is a condition that ultimately leads to tooth loss (Craig, *pers comm*).

23 individuals presented with some calculus on their teeth:



Calculus, like caries, has no bias towards one age or sex. In theory there is an inverse relationship between calculus and caries. Caries result when the surface of the tooth is demineralised, whereas the production of calculus depends upon mineralisation; the two processes are incompatible.

4.3 Periodontal Disease

Periodontal disease is a term used to describe inflammatory changes in the alveolar bone of the gums, caused by accumulation of mineralised bacterial plaque ('calculus') on the teeth when oral hygiene is inadequate (Craig, pers.comm.). Eventually, the alveolar bone begins to recede and the teeth loosen in their sockets and ultimately are lost.

Periodontal disease is one of the most common dental diseases in both modern and archaeological populations, and a major cause of tooth loss in individuals aged 40+ (Roberts and Manchester, 1995).

Sub-gingival calculus on the tooth roots, and inflammatory pitting of the alveolar bone were used as diagnostic criteria

2 individuals presented with periodontal disease. SK 89 had an unusual pattern of bone recession, which occurred only around the upper 1st molars, mainly on the lingual side, exposing the entire root and creating a small pit around them.
See Plate 28.

4.4 Dental Abscess

A periapical abscess is a focus of bacterial infection at the apex of a tooth root, causing pus to accumulate which may drain out through a hole in the bone cortex. The bacterial infection can invade the tooth apex through the cavity created by a caries or from bacterial plaque. If the infection spreads from the abscess in the blood stream, meningitis and haematogenous osteomyelitis can develop (Ortner and Putschar, 1985). Both of these conditions can be fatal.

Five individuals presented with dental abscesses (with SK 100 having two).

See Plates 24, 25, 26 and 27.

4.5 Enamel Hypoplasia

Enamel hypoplasia is a defect in the enamel matrix formation caused by severe nutritional deficiency or disease during the first few years of life, when the permanent teeth are forming. If enamel hypoplasia is present in the deciduous teeth this indicates that the stress occurred when the child was *in utero*, owing, for example, to maternal rubella infection or congenital syphilis (Craig, pers. comm.). Enamel hypoplasia appears as grooving or pitting on the crowns of the teeth.

Seven individuals presented with a generalized distribution of enamel hypoplasia:

Skeleton No	Sex	Age
SK 108	Undetermined	8
SK 113	Female	24 - 30
SK 659	Female	20 - 25
SK 678	Female	18 - 20
SK 1084	Male	40 - 50
SK 4041	Female	12 - 15
SK 4058	Undetermined	7 - 9

It is interesting that the majority of these individuals are young females. However, as enamel hypoplasia indicates severe nutritional or physiological stress in early life, it can be suggested that these individuals may have remained “sickly” as a result of their early experiences, and were therefore prone to die young.

5 BURIAL PRACTICE

Information on burial position was taken from the context sheets provided for the 56 skeletal inhumations.

The predominant burial rite was that of supine inhumation orientated north-south (this was represented by 37 skeletons). There were also 8 supine inhumations that were orientated along east-west lines. There were 7 prone burials and 1 flexed/crouched burial, which was positioned on its left side. There were 4 burials where the individual was supine but with the skull placed at the feet or on the legs.

Supine N-S	Supine E-W	Prone N-S	Prone E-W	Crouched E-W	Supine Decapitated N-S
37	8	5	2	1	3

Most Roman burials were carried out with respect for the humanity of the deceased. This involved respecting the integrity of the body and concern for future well-being, which was expressed through provision of food and drink, light, money and boots for walking. Roman cemeteries are usually located out of towns, alongside roads, or topographical features. The burials are commonly aligned north-south, although it is not unusual for alignment to be influenced by features in the landscape or to be east-west. A burial that is east-west does not immediately confirm the presence of a Christian burial. Graves have also been known to cluster in what appear to be family groupings.

Prone burials are another common feature of Roman cemeteries, especially in rural and poor urban areas. In some cases they are found on the periphery of the cemetery, with few grave-goods, whereas others are 'normal' burials in every way except that they are prone. A few prone burials have been found with signs of violence, buried below large stones, with their hands tied or decapitated. However, in contrast some prone burials are of young children (for example in the Roman cemetery at Spitalfields, London). These bodies may be face down because of careless undertakers, the pitfalls of dealing with shrouded corpses or night time burials. They may also have been outcasts in some way (Taylor 2003). The prone burials from LRG 02 and 13/93 are of 2 males aged 50-60, a female of 40-50 and a juvenile of about 7. Two further burials that were prone were of a 55+ years old female and a juvenile of 6-8 years, who were found buried adjacent to one another. The juvenile was found above another skeleton that of an adult male. This could suggest grave reuse, for example of a family plot. All genders and age groups are represented for the prone position, indicating that prone burial does not appear to have been discriminatory in this population. The positioning of the bodies and the lack of evidence for violence or unusual pathology on these individuals does not lead to a conclusion that these were criminals or outcasts.

The three skeletons that were found supine with the skull placed at the feet or between the legs again represented a full cross section of society. One was a juvenile of about 7-9 years of age, one a female of about 30-40 years and the third a male of about 30 years of age. None of the individuals had evidence for cut marks on the cervical vertebrae or within the vicinity of the neck, which has been suggested as evidence for decapitation. As one skeleton is a juvenile and another a female, it is possible to

suggest that this was not a process reserved for criminals. It is possibly reserved for deviant people, though of what nature it is not possible to say. Their inclusion in the general cemetery with a north/south alignment suggests they were not treated differently with regards the rest of the funerary ritual. Whether the removal of the head was performed post or ante the inhumation process it is not possible to say. Reasons for the positioning of the skull are open to interpretation.

From the context sheets it was also possible to observe that several individuals had been buried with nails, which were possibly hobnails from boots. This presence has been observed at other Roman burial sites, including the first century graves found at Puckridge and the late Roman site at Curbridge in Oxfordshire. In the first case each individual had been supplied with a pair of boots and in the second case the nails were found around the feet of the skeleton. It is surmised that the dead were felt to need a good pair of boots for their journey to the Underworld (Salway 1993).

Many other grave goods were found with the skeletons and perhaps represent how valued that person was in life, and that they had living relatives who were wealthy enough to sacrifice those items. Though the Romans believed in an afterlife it was not necessary to fully equip the dead for it, but for them to take a few personal items.

6 DISARTICULATED REMAINS

The process for analysing disarticulated remains consisted of cataloguing all the bones and where possible identifying age, sex and side. The bones were also divided into whether there was a whole bone, distal, midshaft or proximal part. This information was then manipulated to achieve a Minimum Number of Individuals (MNI) for each bone (Chamberlain 2000). See the results below:

Age	Part	Side	Number of Individuals	
19-40 (25)	IP	right	1	
30-40	MM	m	1	
6 years	MM	m	1	
Adult	BM	left	1	
Adult	CC	left	1	
Adult	CT	left	1	
Adult	CT	right	1	
Adult	CX	left	3	
Adult	F?	right	1	
Adult	FF	left	1	
Adult	FM	left	4	
Adult	HD	right	1	
Adult	HH	left	2	
Adult	HM	left	1	
Adult	HP	left	2	
Adult	IA	right	1	
Adult	IL	left	1	
Adult	IP	left	1	
Adult	IS	left	1	
Adult	M4	midline	1	
Adult	QC	left	4	
Adult	QR	left	18	2 individuals
Adult	QR	right	20	
Adult	RM	left	2	
Adult	RP	right	2	
Adult	RR	left	2	
Adult	SA	left	1	
Adult	SC	right	1	
Adult	SS	left	4	
Adult	TM	left	2	
Adult	TT	left	2	
Adult	UD	right	1	
Adult	UM	left	1	
Adult	UP	right	2	
Adult	UU	right	1	
Adult	VC	midline	1	
Adult	VL	midline	2	1 individual
Adult	VS	midline	3	
Adult	VT	midline	5	
Adult	YA	left	2	
Adult	YC	right	1	
Adult	YH	left	2	
Adult	YM	left	8	2 individuals
Adult	YM	right	13	3 individuals

Adult	YP	left	6	1 individual
Adult	YP	right	4	
Adult	YQ	right	1	
Adult	YS	left	1	
Adult	YY	right	1	
Adult	ZM	right	3	1 individual
Adult	ZM	left	3	
Adult	ZP	right	2	1 individual
Adult	ZT	left	1	
early 20s	MM	midline	1	
juvenile	FD	right	1	
juvenile	FF	left	1	
juvenile	HP	right	1	
Juvenile	IP	left	1	
juvenile	VC	midline	1	
juvenile	YM	left	1	
juvenile	YM	right	1	
Juvenile	YP	right	1	
Mature adult	CF	left	1	
Mature adult	CO	right	1	

The table shows the age, part and side for the bone identified (for code chart see appendix) and then the minimum number of individuals that were possible for this bone. For example, if there were 4 left femurs and 2 right, it would indicate four individuals, as each individual has one left femur. To work out the minimum number of individuals for all the disarticulated remains you take the highest number from any one bone.

There was only a minimum of four individuals. However, this is an absolute minimum number, with the possibility of many more. Pathology observed was restricted to schmorl's nodes on the vertebrae and a clavicle with evidence for degenerative changes.

7 THE CREMATIONS

7.1 Introduction

The analysis of cremated bone aims to determine age and sex of the individual, but also looks at the processes that contributed to the cremation and final interment. The amount of information usually available from cremated bone is far less than that of inhumed bone, however it can still provide valuable information about individuals and the funerary rites.

When a body is cremated, the skeleton is not destroyed, but changes to the colour and composition of the bones do occur. During the cremation, all the moisture is evaporated out of the bone, and the organic component (chiefly collagen) is combusted, leaving only the mineral portion. The bones also fragment and can become distorted in shape with some shrinkage occurring.

It is mostly the body fat that fuels the heat of a cremation. Observations in modern crematoria suggest that once the temperature has reached about 800 °C the fat will ignite, and the fuel jets can actually be turned off. (It is body fat burning that is supposed to explain spontaneous human combustion).

When the body has been cremated, and the pyre has cooled down, the bone fragments are collected. These may be buried directly in the ground, in a small pit, but more usually they are collected together in an urn or in a cloth bag. If they have been collected in an organic container such as a cloth bag, or even a wooden box, this will not survive the burial process, so it will appear that the cremated bone is "loose" in the soil.

It is expected that in a complete dry skeleton (which is approximately the same as a cremated skeleton) the percentages by weight of the different elements are as follows:

Skull: 18.2% (cranium, facial bones and jaw)	Upper Limbs: 23.1% (shoulders, arms and hands)
Axial Skeleton: 20.6% (vertebrae, ribs, pelvis)	Lower Limbs: 38.1% (legs and feet)

Therefore, if the remains of a complete skeleton were collected into a cremation urn, and then the bone was weighed, the proportions would be expected to be as above.

However, usually incomplete skeletons are found in cremation urns. This may be for various reasons:

- Because the relatives (or undertakers) were not very efficient in collecting all the cremated bone from the pyre. (Remember the pyre will consist of a heap of charcoal, partially burnt wood, and possibly stones or burnt clay from the lining of the fire pit. Therefore, it is not surprising that some bone gets left behind).

- Because it wasn't important to collect all the burnt bone, and only a token handful or two was collected for burial in the urn.

- Because only certain body parts were deliberately selected for burial in the urn. If this is the case, it may tell us something about the society doing the cremations. For example, if they seem to collect the skull in particular, that might suggest that they think the head is particularly important.

Frequently, 50% or less of the bone available after cremation is included in the burial (McKinley 2000). Therefore, after the cremated bone has been sorted into the different elements of the body, each element is weighed to establish if the proportion is as expected.

Bone turns the following colours at the following temperatures:

Red/orange	185 °C
Dark Brown/black	285 °C
Black	360 °C
Dark greyish brown	440 °C
Light greyish brown	525 °C
White	645-1200 °C

So the higher proportion of white bone present, the hotter the cremation pyre was.

Sometimes, the pyre may be hot, but it may go out too quickly for the whole skeleton to have been fully oxidized (which is what makes the bone turn white). The less oxidized the bone is, the darker it is in colour.

Sometimes, different parts of a body burn at different temperatures. The amount of body fat has a lot to do with how well a body burns. Fat people cremate better than thin ones! Adults cremate better than children. Therefore, parts of the body with little fat, such as the hands and feet, may not burn as well as the torso. Also, the hands and feet may have lain on the outside of the pyre and therefore received less direct heat.

The number of individuals present in a deposit may be reflected by the number of multiple bone fragments or the size of the bone assemblage. It has been suggested that weights in excess of 2141-2500g are indicative of multiple burials. However, this may not necessarily be an accurate way of defining multiple burials due to much variation of the cremation process.

From the colour and fragment size it is possible to comment on pyre technology and ritual deposition. Inclusion of animal bone and grave goods may also be observed.

7.2 Methodology

The fills of all the cremation urns, and identified cremated material from LRG 02 were stored as soil samples in their surrounding matrix by Foundations Archaeology. The cremation burials were prepared for analysis by sieving into 2mm and 5.6mm fractions to remove any soil matrix, and the resulting residues were dried.

In each case, the 2mm fraction was scanned by eye for any identifiable bone fragments (for example teeth), which were added to the 5.6mm fraction, but was not sorted beyond this. This is because the size of the bone fragments retained in the 2mm sieve is so small that they are unlikely to provide sufficient useful information to justify the time spent sorting the bone from other residues (Mays 1998).

Therefore, all the metric information recorded applies to the 5.6mm fraction only, and does not include the weight of bone present in the 2mm fraction.

The 5.6mm residues were sorted thoroughly. Any identified non-human material (in particular pottery sherds, iron hob nails and a molten glass fragment) were bagged separately. The bone was sorted by hand, and all identifiable bone fragments were selected, and sorted according to skeletal element (i.e. skull, axial skeleton, and upper and lower limbs). The total weight of all identified human bone was recorded according to each skeletal element. This was done in order to identify whether particular elements of the cremated skeleton appeared to have been preferentially selected when the bone was collected from the pyre debris following cremation.

Individual bones were examined for morphological features which would enable the osteologist to determine the sex and age of each individual when cremated, and if possible to identify any pathological conditions affecting the skeleton.

In addition, the bone was examined to identify whether more than one individual was present in either cremation burial, or whether any animal bone had been cremated at the same time.

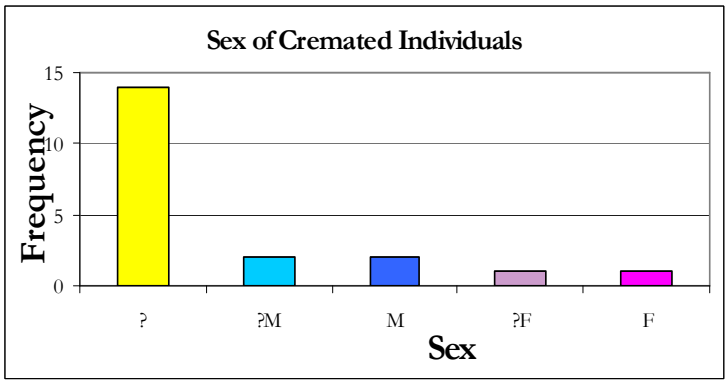
7.3 Number of Individuals

Of the 19 cremation burials analysed, all but one represented a single individual. This was established because all the bones within each cremation burial appeared to be those of the same individual (judged by age-at-death). However, cremation burial number 159 contained largely adult bones, but also a thoracic vertebral body of an individual aged no more than six at death. Because only one juvenile bone was recovered, it is probable that this was not a deliberate multiple burial, but rather that the bones were accidentally con-mingled when a pyre was re-used.

Therefore, a total of 20 cremated individuals were recovered.

7.4 Determination of Sex

Determination of sex from cremated bone relies on the diagnostic parts being available for study and sufficiently well preserved. The nature of cremated material means this is not a common occurrence and there is a reliance on tentative estimation.

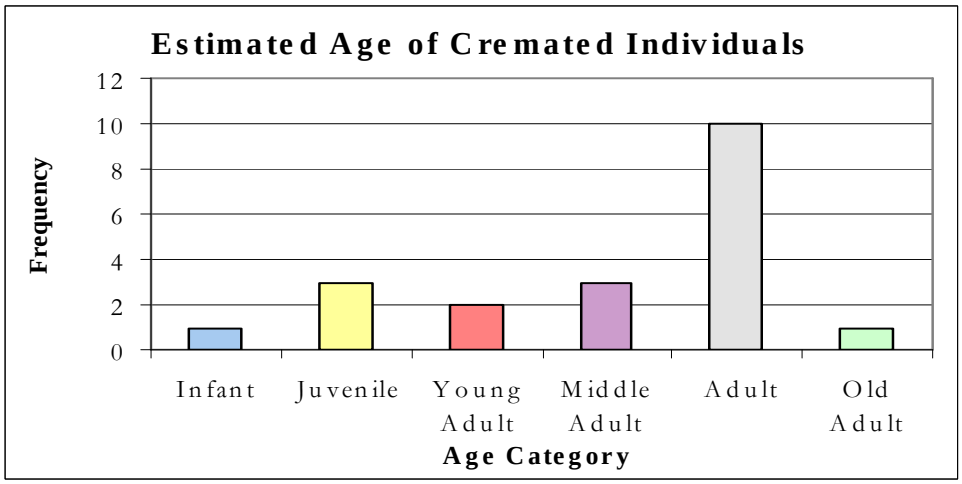


Of the 20 cremated individuals only 6 were assigned a sex.

As is apparent from the graph, there are marginally more males than females, though this is not statistically significant. It is possible to comment that the cremation rite was not reserved for one particular sex.

7.5 Estimation of Age at Death

Estimation of age-at-death also relies on certain diagnostic parts of the skeleton being representedand well preserved. However, it was possible to tentatively assign age to all the individuals within the assemblage. The results are as follows:



All age categories are represented, indicating that there was no discrimination by age for this method of disposal of the dead. The age distribution is similar to that of the inhumations, with few juveniles and many mature adults. Again this appears to indicate that burial in this part of the cemetery was largely determined by age, with juveniles being buried elsewhere.

7.6 Pathology

In general, it is quite unusual to recover bone with pathological lesions from cremation burials, as pathological bone by it's very nature tends to be less robust than healthy bone, and therefore less likely to survive the burial process. The exception to this is joint surfaces which display eburnation (a lesion indicative of degenerative joint disease), as eburnated bone is denser than normal bone.

Four of the cremated individuals presented with pathologies:

Cremation Number	Age	Sex	Pathology
675	Mature adult	?	Osteophytes on vertebral body
683	Old adult	?	Osteophytes on head of femur
694	Middle adult	?F	Schmorl's Nodes and slight osteophytic growth on vertebral bodies
1010	Middle Adult	?M	Schmorl's Nodes

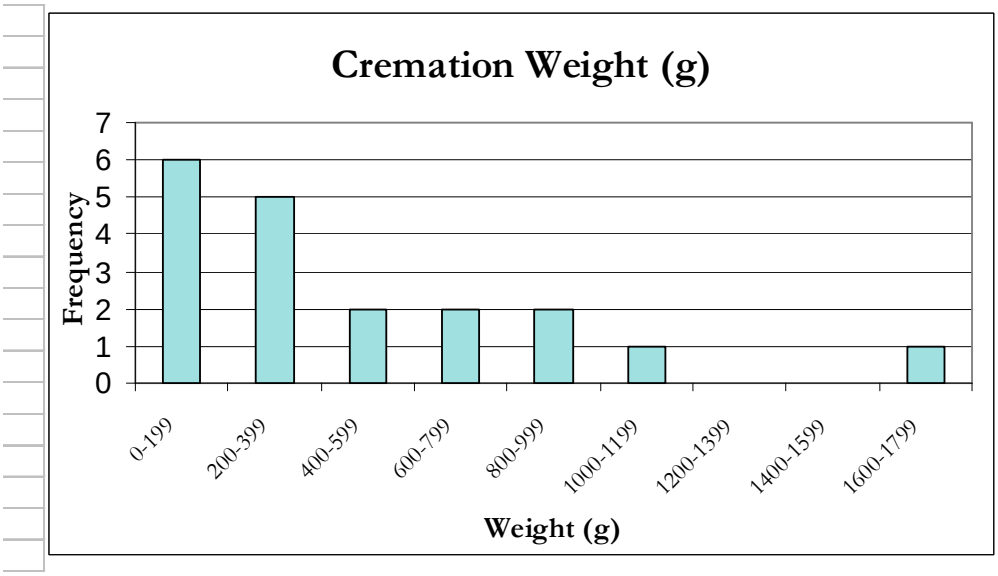
All of these lesions are degenerative, but this reflects the prevalence of degenerative conditions in most human populations.

See Plate 29.

7.7 Weight of Cremation Burials

Cremation weights are a way of determining how much material was collected from the pyre and whether there may be more than one individual represented. However the weight is affected by the method of deposition, post-depositional factors and recovery

methods. The average weight for these cremations was 498g with the highest weight at 1798g and the lowest 81g.



These results indicate that the majority of cremations were under 1000g in weight, and therefore not indicative of multiple burials.

7.8 Collection Bias

The identified bone was divided into skeletal elements (ie head, axial skeleton, upper and lower limbs) so that it was possible to establish if there was a bias in the collection of remains from the pyre. There did not appear to be a particular preference for one part of the skeleton, though the axial skeleton was under represented. However, this may be because this element is in the centre of the body, surrounded by much body tissue, and also in the centre (and therefore the hottest part) of the pyre. In addition these bones (ie the vertebrae, ribs and pelvis) are particularly well endowed with marrow, and will therefore cremate well. Thus it can be anticipated that the axial skeleton will survive cremation less well than other skeletal elements.

7.9 Pyre Temperature

The colour of the bone indicates the pyre temperature achieved. The cremations were predominantly white in colour, with occasional blue-black fragments. This indicates that the temperatures achieved were between 645 and 1200°C, which suggests that well-designed pyre technology was employed.

7.10 Fragmentation of Bone

The degree of fragmentation of the bone was also observed, with the largest fragment size a recorded measurement. Most of the cremations were very fragmentary with small individual fragments. The largest fragment was 100mm in length and 30m in width, although this was unusual. There are two explanations for the small fragment size. Either there was deliberate fragmentation of the bones after cremation, perhaps to enable insertion into a cremation urn, or the fragmentation may result from post-depositional processes. Many of the urns were crushed at some point after burial and

thus did not afford the bone much protection, as many bone fragments were found in the soil matrix surrounding the urns.

7.11 Cremation Urns

Thirteen cremations were found in or around cremation urns (according to information from context sheets). Other finds were also associated with the cremations; whether mixed in with the bone, or found near the urn. These included much ferrous material that has been interpreted as hobnails and coffin nails; both glass which is heated-affected (ie. placed in the pyre) and not; pottery fragments, a copper alloy 'pin', and animal bone. The latter it was found cremated along with the human bone. Some ferrous material was attached to cremated bone, which suggests that it represents artefacts placed on the pyre. Some of the glass was also heat-affected. These finds are similar to those found in with the inhumations.

A particularly interesting cremation is that of 577, which was a young adult male with a good weight of bone and many large fragments. The bone was found in a main cremation vessel and next to it a smaller jar with a lamp tray placed over it sealing the rim (the lamp tray collected the surplus oil from a lamp, and was a common accessory in Britain, where oil was an expensive commodity). The main cremation vessel is unusual in its colour and wide opening and shallow depth. Other pottery sherds were also found. Glass, ferrous material interpreted as nails and pottery fragments were mixed in amongst the cremated bone.

The cremation urns are all individual in style and size, they are simple, turned on a wheel and unpatterned. This suggests they are not specially made for the use of retaining cremated material and as such had little symbolic meaning for those who partook in the funeral.

Other cremated bone was recovered from contexts which were not interpreted as deliberate cremation deposits. The bone weights are very low and there are no pyre goods found with this cremated material. If there were a pyre site in the vicinity, then cremated bone material may scatter in the area, creating these small deposits.

The following contexts contained cremated bone:

Context number	Weight	Description	Finds
121	29g	Long bone frags, possibly animal, 1 rib.	Pot frags
161	40g	Animal bone, long bone frags	Pot frags
191	5g		2 types of pot
565	44g	Bone frags adult human	FE
592	13g	Bone frags, 1 tooth	FE, glass
684	24g	Bone frags	Pottery
1076	4g	Bone frags	

8 CONCLUSION

With a small skeletal assemblage of this nature it is unfeasible to draw any conclusions about the general demography or health status of the population that was buried in the cemetery. However, it is possible to make certain inferences about this particular skeletal sample.

The demographic data obtained from this sample indicates an approximately even proportion of adult males and females (41% and 38% of the total adult population respectively, whilst 21% were of undetermined sex), which suggests that in this area of the graveyard burial location was not dependent on sex.

The number of individuals in each age at death category increases with age. Although this mortality pattern does not match the model life table, as it does not have many juveniles or infants, the increase with age is consistent. The implication of this abnormality has been discussed in the relevant section, but it is worth reiterating that it is possible that adults were specifically buried in this area.

The results suggest a difference in age at death between males and females, with males surviving to an older age. However as mentioned in the relevant section this is not necessarily a true representation of the situation, due to the limitations of the aging techniques which may have under aged many of the female skeletons.

The estimated heights achieved by the individuals from this collection ranged from 1.58-1.78 metres (5’2”-5’6”), with females being shorter than males, which would be expected.

The pathologies observed are fairly typical for this period and range of individuals. There is a good representation of osteoarthritis and other degenerative joint disease. Osteoarthritis in the neck region of several females is suggestive of an occupation related disease, possibly from carrying heavy loads on the head. There are analogies here with the Bath Gate site at Cirencester (Wells 1982), which suggests that this may be an activity, which is common in this region of Britain in this period.

There are a number of fractures, which have all healed well and many in the correct alignment, demonstrating a good level of care for those who were injured. The bones involved were ribs, forearm, hand, lower leg and upper arm.

Many of the male skeletons had strong muscle attachments and stress markers, suggesting a population used to hard physical labour from an early age. This may indicate that this section of the cemetery represented working people rather than the wealthy. One particular skeleton (SK 4012) had an extremely prominent point at the back of the head (the nuchal crest), which may have come from very strong neck muscles, perhaps from wearing a heavy helmet?

Five skeletons had evidence for long-term anaemia, suggesting general ill health. Unusual pathologies were the osteosarcoma (cancer) in the knee of a mature adult male and the auditory torus (nodules in the ear) of another male, which suggested longstanding exposure to cold water.

The dental pathologies identified consisted of caries, calculus, periodontal disease and abscesses. Dental attrition was generally age related and even and there was some tooth loss before death. A few individuals presented with enamel hypolasia, which suggested severe illness in early childhood.

The inhumations were mainly buried in a north-south direction in a supine (face up) position. Several prone burials and a few with the skulls placed between the legs or feet were also present. However, this is considered normal practice for the period, and no obvious patterns were identified which associated particular types of individuals with particular funerary practices.

The cremations had an average weight of 498g (ranging 81-1798g) and represented a roughly even number of males and females. Every age category from infant to mature adult was represented. This suggests that cremation was not a minority rite, reserved only for one section of society. There were however very few juveniles, which again suggested that burial in this part of the cemetery was largely confined to adults. Very few pathological lesions were identified, but this is to be expected among cremation burials. The temperature achieved in the pyres (inferred from the bone colour) was high, roughly 645-1200° C, which demonstrates a good understanding of pyre technology. No evidence was found of deliberate selection of particular body parts for burial. All but one of the cremation burials represented a single individual – the one double burial probably refects accidental con-mingling of bones.

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10 APPENDIX

- Catalogue of Skeletons.
- Codes for Disarticualted Bones
- List of Disarticulated Remains.

Photos

1 Skeleton number 720 – 1st metatarsal
2 Skeleton number 1084 – Ulna fracture
3 Skeleton number 1084 – Ulna fracture
4 Skeleton number 4015 – Ulna eburnation
5 Skeleton number 4015 – Ulna eburnation
6 Skeleton number 86 – 1st metacarpal and phalanx
7 Skeleton number 526 – Spinal osteophytes
8 Skeleton number 526 – Spinal osteophytes
9 Skeleton number 4015 – Spinal osteophytes
10 Skeleton number 659 – Schmorl's nodes
11 Skeleton number 4056 – 3rd and 4th metatarsals
12 Skeleton number 4063 – Spondylosis of 5th lumbar vertebrae
13 Skeleton number 4015 – Sternum trauma
14 Skeleton number 4053 – Humerus fracture
15 Skeleton number 1035 - Osteochondirtis
16 Skeleton number 3041 – Tibial periostitis
17 Skeleton number 604 – Cribra orbitalia
18 Skeleton number 4012 – Nuchal Crest
19 Skeleton number 4012 – Nuchal Crest
20 Skeleton number 74 – Cleft of 1st sacral vertebrae
21 Skeleton number 4063 – Osteosarcoma tumour of tibia
22 Skeleton number 3041 – Retention of the metopic suture
23 Skeleton number 720 – Auditory torus
24 Skeleton number 77 – mandibular abscess
25 Skeleton number 4021 – maxilla abscess
26 Skeleton number 4021 – maxilla abscess
27 Skeleton number 4012 – maxilla abscess
28 Skeleton number 89 – Upper 1st molar root exposure
29 Cremation number 694 – identified bone in anatomical position

Plate 1 - Sk 720 Right 1st Metatarsal: eburnation where rubbed against sesmoid bone.

Plates 2 & 3 - Sk 1084 Right Ulna fracture with associated osteoarthritis in radial head and ulna trochlea notch

Plates 4 & 5 – Sk 4015 Left Radius and Ulna eburnation due to osteoarthritis.

Plate 6 - Sk 86 Right 1st metacarpal and phalanx, eburnation (arrowed).

Plates 7 & 8 – Inferior (left) and superior (right) views of the cervical vertebrae of Sk 526, showing osteophytes and porosity, which are possibly occupation related (carrying heavy weights on the head).

Plate 9 – Sk 4015 Lumbar vertebrae, osteophytes.

Plate 10 - Sk 659 Thoracic vertebrae, schmorl's nodes.

Plate 11 – Sk 4056 Right 3rd and 4th metatarsal bony growth.

Plate 12 – Sk 4063 spondylosis of the 5th Lumbar vertebrae

Plate 13 – Sk 4015 (left) Sternum/manubrium trauma resulting in angulation (on the right: average sternum and manubrium for comparison)

Plate 14 – Sk 4053 Left Humerus: healed fracture with angulation.

Plate 15 – Sk 1035 Left and Right Femoral condyles with possible osteochondritis dissecans

Plate 16 – Sk 3041 Tibia periostitis

Plate 17 – Sk 604 Orbits cribra orbitalia

Plates 18 & 19 – Sk 4015 Nuchal Crest of unusual size (side and front view)

Plate 20 – Sk 74 Cleft 1st sacral vertebrae

Plate 22 – Sk 3041 retention of the metopic suture

Plate 23 – Sk 720 Auditory Torus

Plate 24 – Sk 77 Dental abscess (arrowed)

Plates 25 & 26 – Sk 4021 maxilla dental abscess from inferior (left) and superior (right) views.

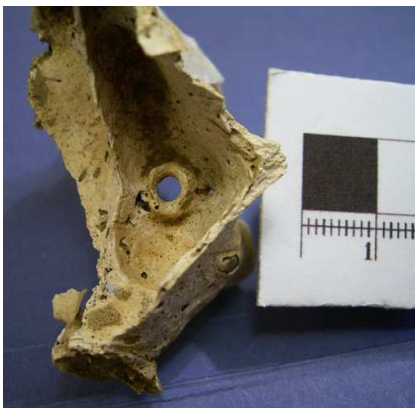

Plate 27 – Sk 4012 maxilla dental abscess, lingual side.

Plate 28 – Sk 89 maxilla 1st molars root exposure

Plate 29 – Cremation 694 adult female, identified bone laid out in anatomical position

APPENDIX 2

The Pottery
by Jane Timby

THE POTTERY FROM 124-130 LONDON ROAD, GLOUCESTER
by Jane Timby

ROMAN

Introduction

The archaeological work resulted in the recovery of 1511 sherds of Roman pottery weighing 16.8 kg and with 1053 estimated vessel equivalence. Overall the pottery ranged in date from the Claudio-Neronian period through to the late 4th century. Approximately 16% of the assemblage by sherd count came from post-Roman horizons, the remainder from stratified Roman contexts.

The condition of the material was variable. Several of the vessels were from burial contexts and were in semi-complete state but only one vessel, a colour-coated beaker survived intact. Some of the vessels may have been complete when deposited and have since become fragmented through disturbance or they may have been deliberately smashed as part of the mortuary practice. This is particularly likely with examples that showed signs of burning and subsequent disintegration. In several cases only the bases of vessels were present suggesting possible truncation of the upper levels. The general lack of rims means that dating can only be quite broad in many cases being based on the currency of the fabric.

The Roman pottery was sorted into fabrics using the Gloucester City type fabric codes (cf. Ireland 1983; Timby 1986; 1991; Hurst 1985) and quantified by sherd count, weight and estimated rim equivalence E.V.E.) for each recorded context. A quantified summary of the resulting data can be found in Table 1. A copy of the complete pottery database will be deposited with the site archive. Pottery from the post-Roman levels is integrated into Table 1 but is not discussed further.

The Roman assemblage derives from a number of different contexts. Of the 1213 stratified Roman sherds, 540 (44.5%) came from the cremation burials, 167 (13.8%) from the inhumation burials and the remaining 506 sherds from various pits, ditches, gullies and layers.

Roman burials

Pottery was associated with 17 cremations, a more detailed catalogue of which can be found below. None of the vessels survived intact and in many cases only a few sherds were present so it was unclear whether these represented burial urns, accessory vessels, deliberately deposited sherds or were simply stray finds. In addition, potsherds were recovered from the fills of 23 inhumation burials. Only one grave, 4066, produced a complete vessel suggesting that this had been placed as a grave good.

Cremations

The cremation burials appear to date to the pre-Flavian period through to the early 2nd century. A detailed catalogue of the cremation vessels can be found below. None of the vessels were complete and in most, if not all cases, the vessels may have been deliberately broken at the time of burial. The recovered sherds could not be reconstructed to account for complete vessels so it is unclear whether only portions of the vessels were interred. Many of the fabrics are locally made Kingsholm or Gloucester wares whose origins relate specifically to the military fortress and subsequent fort. The earlier cremations could well be military in origin or contemporary with the occupation of the Kingsholm fortress. In particular these include cremations 168, 576, 582, 656, 671, 680 and 693. All these burials include wares made in fabrics and or forms specifically associated with the military occupation at Kingsholm. Specific fabrics include Gloucester type fabric (TF) 24, 36, 39 and 213. At least two burials contained typologically early ring-necked flagons, cremation group 577 included an open lamp and cremation 656 two stamped South Gaulish dishes (Dragendorff 15/17) and a Hofheim-type flagon. In some cases, notably two of the three vessels from 656, the vessels have been burnt causing spalling and fragmentation. Five of these burials lie on the north-eastern part of Area 2. The number of vessels per burial ranges from one to a maximum of four.

Two burials (518 and 682) appear to be slightly later in date but probably still dating to the 1st century. A further four burials could date to the later part of the 1st century or earlier 2nd century (158, 585, 634 and 1009). These contain locally made wares, mainly Gloucester TF 11A, and in the case of 585 a rusticated jar of a type associated with kilns found at Kingsholm Rugby Ground. The latest burials, 146, 666, 674 and 4025 are probably early 2nd century. All these contain Dorset black burnished ware (BB1) thin-walled jars decorated with acute lattice. Cremation 666 produced a Dorset black burnished ware jar and a Severn Valley ware jar making it potentially the latest. Conventionally BB1 is dated from the early 2nd century onwards in this area but BB1/ Durotrigian ware was reaching Gloucester in the later 1st century so a slightly earlier date cannot be discounted.

Catalogue of cremation vessels

1. Cremation 146 (147). Dorset black burnished ware (TF 4) jar decorated with acute line lattice. The vessel is fragmented and partially burnt. The base is missing. Approximately 85% present. Early 2nd century **(Figure 1.1)**.
2. Cremation 158 (159). 19 sherds (48 g) of fabric TF 11A which may have represented a burial vessel; the same context yielded one small sherd of Dressel 20 amphora and two small scraps of Dorset black burnished ware, presumably intrusive. Date: 1st or early 2nd century.
3. Cremation 168 (169). Several sherds from the base and lower body of a large greyware closed form, probably a jar. Clumsily made in TF 213. Date: Pre-Flavian.
4. Cremation 518 (517). Several sherds (25 weighing 420 g) from lower part of a black sandy jar with an oxidised interior. TF 25. 1st century. Also present are 11 sherds (29 g) of TF 11A. Date: 1st century.
5. Cremation 576 (577). Minimum 4 vessels. (i) Small fragmented grey-brown jar with short everted rim in TF11A **(Figure 1.2).** 20 sherds weighing 168 g. Approximately 75% complete. (ii) Base and bodysherds from a closed form (45 sherds, 1399 g), probably a jar, grey brown in colour TF11A. (iii) Large

flat rim, carinated bowl. TF36. Approximately 66% present, 5 sherds, 1066 g **(Figure 1.3).** (iv) Open lamp, TF 36 **(Figure 1.4).** Almost complete with no signs of burning or use. (v) The same context also produced 2 sherds of TF 24, 5 sherds of TF 7, 2 sherds of TF 25. Date: Pre-Flavian.

6. Cremation 582 (583, 584). Minimum 2 well fragmented vessels. (i) Ring-necked flagon. TF 24 burnt, 62 sherds, 196 g; (ii) everted squared rim jar. TF 39. Some sherds burnt. 29 sherds, 434 g. Date: Pre-Flavian.
7. Cremation 585 (586). (i) Almost complete but fragmented necked jar with rusticated decoration, slightly distorted and very highly fired. TF 230. 34 sherds, 440 g. **(Figure 1.5).** Date: Flavian – early 2nd century.
8. Cremation 634 (633). (i) Base of a greyware closed form. TF11A. 11 sherds 757 g. Date: 1st – early 2nd century.
9. Cremation 656 (657). Minimum 3 vessels. (i) South Gaulish dish, Dragendorff 15/17. Very fragmented. Originally stamped. Not burnt. **(Figure 1.6)** (ii) Second almost identical dish, heavily burnt. Central stamp OFACVT[..]. **(Figure 1.7)** Total (i) and (ii) 62 sherds 437 g. (iii) Very fragmented, with spalled sherds, heavily burnt collared (Hofheim-type) flagon, TF 24. 145 sherds, 822 g. **(Figure 1.8)**. Date: Pre-Flavian.
10. Cremation 666 (667, 668). Minimum 2 vessels. (i) Everted rim Dorset black burnished ware jar with acute lattice decoration. 90 sherds, 694 g. **(Figure 1.9)**. (ii) Base and bodysherds from a closed form in oxidised Severn Valley ware (TF 11B). 54 sherds, 602 g. Date: early 2nd century.
11. Cremation 671 (673). (i) Lower half of closed form, TF39. 23 sherds, 276 g. Date: Pre-Flavian.
12. Cremation 674 (675). Minimum 2 vessels. (i) Bodysherds and handle from a flagon, TF 24, burnt. 13 sherds, 45 g. (ii) Dorset black burnished ware jar sherds. 22 sherds, 193 g. Date: Flagon typical of pre-Flavian period, jar probably later 1st or early 2nd century.
13. Cremation 680 (681). A few sherds from a closed form, probably a flagon in TF 24. 6 sherds, 24 g. Date: Pre-Flavian.
14. Cremation 682 (683). Minimum 2 vessels. (i) Ring-necked flagon (rim only) TF 11A. (ii) Base and bodysherds grey, sandy ware jar. TF 35. 36 sherds, 274 g. Date: Flavian onwards.
15. Cremation 693 (694). (i) Several sherds from a flat rim deep bowl. TF 36, 27 sherds, 500 g, **(Figure 1.10)**. (ii) 11 sherds (77 g) in other fabrics, probably stray pieces, TF 10A, 11A, 24, and unclassified grey ware. Date: Pre-Flavian.
16. Cremation 1009 (1010-11). Base and bodysherds from a greyware closed form, TF 11A. 10 sherds, 452 g. Date: 1st/early 2nd century.
17. Cremation 4025 (4026, 4027). Minimum 2 vessels. (i) Several sherds from a Dorset black burnished ware jar decorated with an acute lattice. 35 sherds, 645 g. (ii) A single sherd from a flat rim bowl, TF 36, 57 g. Date: Late 1st-early 2nd century for vessel (i); vessel (ii) pre-Flavian and possibly an intrusive sherd.

Inhumations

Pottery was associated with 23 inhumation burials (see Table 2) but in only one case, 4066, is the pottery likely to be a deliberate grave good. This grave produced a complete small colour-coated beaker (Fig. 00. 10) along with a perforated disk (Sf 20) made from the base of a beaker (Fig. 00.11). The *tpq* provided by the material incorporated into the grave fills suggests a mixture of earlier and later Roman burials.

Although the dating can only be regarded as provisional the inhumations do appear to fall into two discrete groups with the earlier ones coming from Area 1 and the later ones with pottery of 3rd or 4th century currency coming from Area 4. The earlier graves mainly contain sherds of Gloucester kiln ware (TF 7, 11A), Kingsholm military ware (TF 24, 36), samian or amphora. The later graves contain Dorset black burnished ware, Severn Valley ware and in one case, colour-coated ware.

Catalogue of pottery grave goods

1. Inhumation 4048 (4066). (i) A totally complete small colour-coated beaker, TF 12R. **(Figure 1.11)**.(ii) Worn perforated disk made from the base of a colour-coated beaker, probably TF 12R. Sf 20, **(Figure 1.12)**. Date: 3rd or early 4th century.

Other features

Roman pottery was recovered from 20 linear features (ditches/gullies), 3 postholes and 15 pits, a total of some 500 sherds. Most of the groups are thus quite small and featured sherds relatively scarce. The pottery broadly reflects the range of material seen in the burial assemblages. Imports are surprisingly limited, with no continental imports other than samian and amphora and one possible whiteware (TF 211). Ditch 154 in Area 1 appears to contain earlier Roman sherds, with 2nd century sherds from the southern arm (1037, 1077, 1081). The ditches and gullies in Area 2 similarly seem to be producing 1st or 2nd century sherds, the former coming from 552, 597 and 648; the latter from 527, 542, 589, 654, 697, and 703. In Area 3 ditch 3043 produced five small sherds of Malvernian limestone-tempered ware (TF 33) suggesting this is the earliest feature in this area, potentially dating to anywhere in the 1st century AD. Linear 3045 appears to be 1st century and 3013 of 2nd century date. The same broad picture applies to the pits with pottery, the emphasis of activity again focussing on the 1st-2nd century. Of specific note are three large sherds of Camulodunum Type 186 (Peacock and Williams 1986, class 17/18) amphora from Cadiz, Spain in pit 593.

The CBM includes a number of Roman roofing tile (tegulae and imbrices) and pilae. None of the pieces was stamped and no obvious hypocaust fragments were present.

MEDIEVAL

A total of 325 sherds of Medieval currency were present associated with 36 individual contexts. Much of the material appears to date to the 12th-13th centuries with a range of material typical for Gloucester, in particular limestone-tempered wares (Gloucester type fabric (TF) 41), Malvernian wares (TF 40, 52), limestone and sand-tempered ware (TF 43), Minety ware (TF 44), and sandy wares from Hereford, Worcester and the Forest of Dean.

As with the Roman material the quality of the assemblage is quite poor in that domestic wares dominate with few higher quality tablewares such as glazed jugs.

A number of the CBM fragments could date to the Medieval period, in particular partially glazed roof tile and some brick fragments.

POST-MEDIEVAL

A moderately small assemblage of post-medieval ware was present and most of this could date to the 17th-18th century, for example, glazed red earthenware, Nottinghamshire stoneware, Devon gravel-tempered ware, slip decorated ware, Border wares (TF 54), German stone ware and a single sherd of Tudor Green.

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APPENDIX 3

The Metal Small Finds
by Hilary Cool

The metal small finds from 124-130 London Road, Gloucester (LRG02)

H.E.M. Cool

Report submitted June 2004; revised July 2004

Metalwork was found associated with four cremation burials and seven inhumations as well as from two non-funerary features. In many cases it is in very poor condition and very highly corroded. As a result, the copper alloy, as well as the iron-work, has had to be studied from X-radiographs, and in several cases the illustrations are derived from the X-radiograph

The cremation pit fill finds

The ironwork from the cremation pit fills provides an exception to the normal rule of very poor preservation. Many items show no corrosion whatsoever. This is indicative of them having been burnt on the pyre. Burnt nails were recognised in the fills of cremation burials 656 (no. 3), 671 (nos 9-14) and 693 (nos. 16-22). There are three ways in which they might have been included in the pyre. They might have been used to during the construction of the bier or coffin used to convey the body to the pyre; they might have been used during the construction of some other type of pyre good; or they might have been left in the wood used as fuel, if that was scrap wood derived from structural sources. A noticeable feature of the burnt nails is that they have very small heads and in some cases are short. If the nails found buried at Inchtuthill are taken as typical of later 1st century nails, the smallest have heads ranging from 9.5mm to 16mm and lengths ranging from 38 to 70mm (Manning 1985a, 292 Table XVIII Group B). Of the complete burnt nails nos. 9-12 are smaller than this with regard to both head size and length, whilst the others (nos 3, 16-8, 22) are smaller in either the head diameter or the length. It seems likely, therefore, that these nails were not the standard type of nails used for structural work, and so probably related to some form of pyre good. Small nails have been found associated with funeral pyres before, and it has been possible to show that these were likely to have been associated with the construction of biers (Mould in press); but whether this is the explanation here is unknown. The only cremation burial to produce corroded ironwork that had possibly not been burnt was 656 (nos. 4-7), again at least two of these nails were very small (nos. 5 and 7).

The deceased in cremation burial 671 probably went to the pyre wearing a pair of nailed shoes as burnt hobnails were recovered (no. 8). Though hobnailed shoes are found in sizes appropriate for children (Quita Mould *pers comm.)*, most are in adult sizes so it is probably that this individual was adult.

The only other metal find from a cremation burial was no. 15 from 682. This is very corroded and fragmentary but is likely to be part of a round-bowled spoon of 1st to 2nd century (Crummy 1983, 69 Type 1). The condition is so poor that it is not possible to say whether it was placed on the pyre, or whether it was a chance inclusion.

The metal finds with the inhumations

The metal finds deliberately placed in the graves tended to be personal ornaments, but nails possibly indicative of coffin construction were found in 686 (24-5) and 4038 (nos. 31-6). In the former, one of the nails retains minerally replaced wood, strongly suggesting this could indeed be from a coffin rather than a chance inclusion.

One of the deceased was found wearing bracelets (nos. 1-2 from 1012), and bracelet fragments were also found in the fills of 658 (no. 23) and 4034 (no. 28). In the case of the former, approximately half was found around or near the left forearm so it was probably an item of worn jewellery; in the case of the latter, it is virtually complete though broken. It probably was a grave good, though there is no evidence that it was worn. Both nos. 23 and 28 are cable twist bracelets. This was the commonest bracelet type in Roman Britain (Cool 1983, Group 1; Swift 2000, 124). Examples are known as early as the 2nd century but by far the majority are of 4th century date. The two brooches from 1012 are both 4th century types. No. 1 is a multiple unit bracelet (Cool 1983, Group XXXI; Swift 2000, 145), no. 2 is a plain hook and eye bracelet with hooked terminals (Cool 1983, Group XXXIVB). There are hints that the latter may have been more popular in the mid to later part of the century than earlier in it.

Bracelets are a common inclusion in the graves of 4th century women and girls in Britain; sometimes worn, sometimes placed unworn in the grave. At 124-130 London Road, osteological analysis has confirmed that skeletons in the graves where bracelets occurred were adult females of varying ages. 659 (grave 658) was a younger woman of 20-25 years, 1014 (grave 1012) is described as a middle adult, and 4036 (grave

4035) an older woman of about 50. Clarke, in studying the associations at the Lankhills cemetery in Winchester, argued that worn ornaments were a sign of immigrant status (Clarke 1979, 376); but it has long been clear that the ways in which they were deposited varied greatly between the major cemeteries in Britain, and the equation of particular rites with an immigrant status can not be applied uniformly across the province (Philpott 1991, 142-4). Subsequent work has laid more stress on the age of the deceased; and suggested that whether a girl or woman was buried wearing jewellery, may have depended on the stage of life she had reached (Gowland 2001, 162). At London Road, bracelets accompanied adult females of all ages but no child had them, despite approximately 15% of the burials being children. This is in interesting contrast to the pattern that has sometimes been observed, where children, presumably girls, were provided with many items of jewellery, and especially with bracelets (*ibid* 160). The sample is very small, but the pattern serves to remind us that Romano-British society was not homogenous, and different communities expressed their identities in different ways.

The material associated with 4066, an adult of undetermined sex, is particularly interesting. It consists of a brooch (no. 25), a buckle (no 26) and fragments of riveted sheet that could well come from a buckle or belt plate (no. 27). The brooch belongs to the British oval gilded series, though it has now lost the stamped gilded bands that would have filled the two concentric cells. These were in use during the 3rd century (Mackreth 1998, 146-7), a time when in Britain the habit of wearing a brooch had declined markedly. Finding a 3rd century grave where a person is accompanied by a brooch is, therefore, very unusual. The only instances of such inhumations that Philpott found were at Ospringe (Philpott 1991, 139), and in both of those cases the brooch was of later 1st to 2nd century type.

The buckle is a late 2nd to early 3rd century military type; generally associated with the auxiliary, though it has been in the legionary fortress at Caerleon (Webster 1992, 121 no. 80). These have been found with openwork buckle plates, but plain sheet ones are also known (see Oldenstein 1977, Taf. 75 nos. 986-7), so it is not implausible that the fragments no. 27 could be associated with the buckle. The individual thus appears to have been accompanied by at least parts of a military belt as well as the brooch, all of which would have been old when deposited. As with the brooch, it is very unusual

for anyone to be buried with belt fittings prior to the 4th century (see Philpott 1991, 187-8). The grave was truncated by a modern trench and it is possible that these finds were not originally associated with the burial. If they were, this is a most intriguing deposit. Gloucester was founded as a veteran *colonia*. Is there a hint here that it continued to be an appropriate place for soldiers to retire to?

Another grave with possibly military connections is 4037, which appears to contain a spearhead (no 29). Again it is disturbed, and not everything associated with it is likely to have been a deliberate inclusion. No 30 for example, is a T-clamp (see Manning 1985b, 131), a piece of structural ironwork entirely out of place within a grave. No. 29 is very corroded but the X-radiograph is consistent with it being a damaged leaf-shaped spearhead (see for example Manning 1985b, pl 76 no. 30-2).

The only other find possibly associated with a grave is a fragmentary ring of uncertain function from 4068, associated with infant burial 4067 (no. 37).

In addition to the finds from the burials, whether deliberately included or not; there is also a bell-shaped stud from feature 1082 (no. 38). It is an example of an Allason-Jones (1985) Type 1 with an iron shank. These had a variety of uses including acting as dagger pommels, dolabra sheath fittings and box fittings. They are common finds, in use throughout the Roman period

Catalogue

Area 1 Inhumation 1012

1 Bracelet. Copper alloy. Multiple unit. Rectangular section tapering to hook and (broken) eye terminal with blocks behind. Surfaces much corroded and complete pattern not recoverable in current state but traces of transverse grooves dividing hoop up into different decorative panels. Diameter 67 x 59mm, hoop section 5 x 3mm. 1014 sf 11

2 Bracelet. Copper alloy. Plain bracelet. Rounded square-section tapering to blocked broken hook and eye terminals. Diameter 66 x 59mm, section 4 x 4mm. 1014 sf 11

Area 2 Cremation burial 656

3 Nail. Iron; not corroded. Complete flat-headed nail with square shank. Head diameter 9mm, length 30mm, shank section 2mm. 657

4-7 Nails. Iron; corroded. Four head and shank fragments and one shank fragment. 657

Catalogue no	Head Diameter	Present Length
4	14	28
5	9	16
6	10	9
7	7	15

Area 2 Cremation burial 671

8 Hobnail. Iron; not corroded. Two conical-headed hobnails. Lengths 17mm and 15mm (tip broken); head diameters 8mm. 672

9-14 Nails. Iron; not corroded. Four complete flat-headed nails with square shanks; two head and shank fragments; two shank fragments. 672

Catalogue no	State	Head Diameter	Length	Shank section
9	Complete	8mm	26mm	2mm
10	Complete	7.5mm	24mm	2mm
11	Complete	8mm	25mm	2mm
12	Complete	7mm	22mm	2mm
13	Incomplete	7mm	-	2mm
14	Incomplete	8mm	-	2mm

Area 2 Cremation burial 682

15 Spoon. Copper alloy. Circular-sectioned shank, end missing; small fragment of circular bowl extant. Very corroded. Length 49mm, section 3mm. 683 sf 42

Area 2 Cremation burial 693

16-21 Nails; circular-headed. Iron; not corroded. Three complete flat-headed nails with square shanks; three head fragments; three shank fragments. 694

Catalogue no	State	Head Diameter	Length	Shank section
16	Complete	15mm	19mm	2mm
17	Complete	15mm	27mm	2mm
18	Complete	9mm	41mm	3mm
19	Incomplete	9mm	-	3mm
20	Incomplete	9mm	-	3.5mm
21	Incomplete	10mm	-	-

22 Nail; square-headed. Iron; not corroded.. Complete nail with flat square head and square shank. Head width 7mm, length 36mm, shank section 3mm. 694

Area 2 Inhumation 659

23 Bracelet. Copper alloy. Cable-twist, three strands right hand twist. Both ends broken. Diameter 65mm, section 4mm. 659 sf 8

Area 2 Inhumation 686

24-5 Nails. Iron. Two head and shank fragments of flat-headed nails and one shank fragment. 25 retains mineral-replaced wood, nail passes through grain. 686 sf 31.

Catalogue no	Head Diameter	Present Length
24	16	45
25	16	20

Area 2 Inhumation 4066

25 Brooch. Copper alloy. Oval plate with central oval cell and two concentric oval cells surrounding it. Spring of two turns either side of a central lug; trapezoidal catchplate; fragments of pin extant but detached. Part of edge chipped; central cell infilled with much corroded material Length 36mm, width 28mm. 4066 sf 18

26 Buckle. Copper alloy. Oval frame with ends forming internal scrolls; double loop projections holding cross-bar for copper alloy buckle tongue. Width 38mm, length 32mm. 4066 sf 17.

27 Belt plate. Copper alloy. Very corroded fragments of sheet. Perforations along long edges, six extant, one retaining flat disc headed stud. Width c. 24mm. 4066 sf 17.

Area 4 Inhumation 4035

28 Bracelet. Copper alloy. Cable-twist, two strands right hand twist; broken terminals with one strand forming a cuff of one turn. Now in 6 fragments and much corroded. Diameter c. 70 x 60mm, section 5 x 4mm. Five fragments 4035 sf 14 found below pelvis, one fragment from fill 4035 sf 23

Area 4 Inhumation 4038

29 Spear-head. Iron; corroded. Broken socket, remnants of leaf-shaped blade broken along one side and at end. Present length 100mm. 4038 sf 28

30 T-Clamp. Iron; corroded. Complete. Length 80mm, width 35mm. 4038 sf33

31-6 Nails. Iron; corroded. Six head and shank fragments, nine shank fragments. 4038 sf 33

Catalogue no	Head Diameter	Present Length
31	14	47
32	20	42

33	17	20
34	13	54
35	18	13
36	18	20

Area 2 Inhumation 4067

37 Ring. Copper alloy. Two fragments, square section expanding to thin rectangular-section; all ends broken. Diameter c. 23mm, minimum section 1mm, maximum section 3 x 1mm. 4068 sf 21

Fill of linear feature 1082

38 Bell-headed stud. Copper alloy cylindrical head with flared upper edge; upper face has recess around flat-topped cone; iron shank, now detached. Total length c. 60mm. length of head 15mm, maximum diameter of head 29mm. sf29

Fill of wall trench 141

39 Fragment. Copper alloy.

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APPENDIX 4

The Roman Glass Vessels
By Hilary Cool

The Roman glass vessels from 124-130 London Road, Gloucester (LRG02)

H.E.M. Cool

Report submitted May 2004

Roman vessel glass was found in six of the cremation pit fills. By far the commonest vessel was the tubular unguent bottle with sheared rim, which was present in three of the pits (nos. 5-9, 13, 16-8, 20-30). This was the dominant form of the middle 1st century, and went out of use during the early Flavian period (c. AD 75 – 80 – Price and Cottam 1998, 169). There are good grounds for considering that these bottles contained the oil used during visits to the baths because their decline is matched by the rise of the spherical bath flask (*ibid* 188*)*.

In no case at London Road can a complete profile be reconstructed, though one example (no. 20 from Cremation pit fill 672) is virtually intact lacking only the rim edge. Calculating the precise numbers represented is difficult as the vessels were clearly being placed on the pyre and so are often found considerably deformed which precludes any attempt to fit the pieces together. The total as measured by zonal EVEs (Cool and Baxter 1996) is shown in Table 1, but the actual numbers involved could be considerably higher.

Pit fill	Blue/green	Light green	Light yellow/green	Deep Blue	Total
657	1.6	0.4	0.8	0.6	3.4
672	2.6	-	-	-	2.6
694	3.4	-	-	-	3.4
Total	7.6	0.4	0.8	0.6	9.4

Table 1: Incidence of tubular unguent bottles by EVE measures

The range of colours seen in cremation pit fill 657 is exceptional. In Britain nearly all of these little bottles are made of blue/green glass. Sometime other light shades such as yellow/green are found but these tend to be rare. At Kingsholm, for example, there were a minimum of two yellow/green ones to 16 blue/green ones (Price and Cool 1985, 44). Deep blue examples are even rarer. There are single examples of each from Sheepen and the Stanway cemetery (both outside of Colchester). In both of

these cases an early post-Conquest date may be suspected (Cool in Crummy forthcoming). There is also an example in the Yorkshire Museum which is likely to come from York (Accession number 1995.352). Most glass in York can be dated to the Flavian period or later given the likely foundation of the fortress in AD 71-3; but Claudio-Neronian finds have been found outside of the fortress area (Cool 1998), and so the presence of the blue unguent bottle at York does not necessarily imply a late date for the use of this colour. The absence of blue unguent bottles from the large later Neronian assemblages at Kingsholm and Usk (Manning *et al* 1995, 175 nos. 84-91), and their presence at such sites as Sheepen and Stanway hints that they may have gone out of use earlier than the bulk of the blue/green ones. This would suggest that the cremation burial represented by Pit fill 657 could have taken place in the Claudian or early Neronian period, as it should be remembered that these bottles were just cheap packaging for their contents. It is unlikely that they would have been long curated.

Another vessel from this cremation pit fill, the flask no. 4, also suggests an early date as the type of narrow fire-rounded horizontal rim is very rare, but when found tends to be early. On example was found in a pre-Boudiccan context at Sheepen (Harden 1947, 305 no. 87), another was found in a pre-Flavian context in the fortress at Usk (Manning et al 1995, 176 no. 93).

One other type of unguent bottle is represented by the rim fragment no. 33 from cremation pit fill 1055. On this the rim edge is rolled and so the vessel is likely to have been later than the tubular form as this tended to be the rim form preferred on the unguent bottles that replaces the tubular form in the later 1st century.

All of the forms discussed so far have been containers whose contents would have played a role in the funerary ritual, but there is also one item of tableware represented by the colourless fragments no. 1 from cremation pit fill 577. Colourless glass starts to appear about AD 60-65, but blown wheel-cut vessels such as no. 1 would have been, do not become common until the end of the century and are commonest in the 2nd century (see for example Price and Cottam 1998, 88, 91-9). 577 is therefore most likely to be later than the other cremation pit fills that contained glass.

It is possible that the contents of the unguent bottles and flasks were being used in a variety of ways in the funerary ritual. In cremation pit fill 657 all of the tubular unguent bottle fragments showed heat distortion indicating they had been placed on the pyre, presumably after their contents had been used to prepare the body or perhaps perfume the pyre. The flask no.4, by contrast shows no evidence of having been in contact with the heat, perhaps hinting that the contents were used after the body had been burnt: to pour over the pyre after it had died down or, perhaps, over the calcined bones. A similar pattern of burnt and unburnt (nos. 26, 29) vessels is seen in cremation pit fill 694, but in pit fill 672 (nos. 20-23), the bottles show no evidence of burning. This is the only grave where a virtually intact vessel was placed with the urn which perhaps hints at an uncommon burial rite for its occupant who was an adult female. It is unfortunate that this is the only burial where glass can be associated with an individual of known age and sex at London Road, making it impossible to explore whether the different patterns of use depended on who the deceased was. The evidence from elsewhere in the cemetery (cremation pit fills 577, 583 and context 1042) makes it clear that the use of glass vessels, most probably containers, was not uncommon in the ceremonies around the pyre prior to the body being burnt. This is a pattern often seen in mid 1st century cemeteries associated with major urban and military sites.

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Catalogue

Cremation Pit fill 577

1 Body fragments (3). Colourless. Straight side; 2 wheel-cut lines. Dimensions (largest) 24 x 15mm, wall thickness 2mm. Context 525 sf22

2 Melted lumps (2). Blue/green. Context 577 sf34

Cremation Pit fill 583

3 Melted lumps (2). Blue/green. Context 583 sf24

Cremation Pit fill 657

4 Flask, rim and neck fragment (2 joining fragments). Blue/green. Narrow rim, bent out horizontally and fire rounded; cylindrical neck starting to bend out slightly to body. Rim diameter 19mm, present height 52mm. EVE 0.6. Context 657 sf 19

5 Tubular unguent bottle, complete rim and upper neck fragment. Blue/green. Outbent rim, edge sheared; cylindrical neck. Distorted by heat. Rim diameter 19 x 18mm, present height 25mm. EVE 0.4. Context 657 sf 19

6 Tubular unguent bottle, complete rim and part of upper neck fragment. Blue/green. Outbent rim, edge sheared; cylindrical neck. Distorted by heat. Rim diameter 19 x 13mm, present height 25mm. EVE 0.4. Context 657 sf 19

7 Tubular unguent bottle, lower body and base. Blue/green. Flattened and distorted by heat. EVE 0.4. Dimensions 20 x 12mm, Context 657 sf 19

8 Tubular unguent bottle, small fragment from lower body and slightly flattened base. Blue/green. Maximum body diameter 17mm, present height 21mm. EVE 0.4. Context 657 sf 19

9 Tubular unguent bottle, two fragments from lower bodies and bases. One certainly, and one possibly, heat affected. Context 657 sf 19

10 Body fragments (3). Blue/green. Context 657 sf 19

11 Body fragments (9). Blue/green. All affected by heat ranging from slightly deformed to completely melted. Context 657 sf 19

12 Body fragments (5). Blue/green. All affected by heat, completely melted. Context 657 sf 25

13 Tubular unguent bottle; three lower body and base fragments. Light green. Heat affected and some broken edges fire rounded. EVE 0.4. Context 657 sf 19

14 Body fragment. Light yellow/brown. Context 657 sf 19

15 Melted lump. Light yellow/brown. Context 657 sf 19

16 Tubular unguent bottle, rim, neck and body fragments (4). Light yellow/green. Outbent rim, edge sheared; cylindrical neck tooled at base; fragment of lower body. Distorted by heat. Rim diameter 14 x 19mm. EVE 0.8. Context 657 sf 25

17 Tubular unguent bottle, fragment from lower body and slightly flattened base. Deep blue. Heat affected. Maximum body diameter c. 20mm, present height 21mm. EVE 0.4. Context 657 sf 19

18 Tubular unguent bottle, two fragments from lower bodies. Deep blue. One heat affected. Context 657 sf 19 sf 25.

19 Unguent bottle, neck fragment? Deep blue. Fragment melted and distorted, very narrow tapering neck? Present length 28mm, maximum diameter 9mm. EVE 0.2. Context 657 sf 19

Cremation Pit fill 672

20 Tubular unguent bottle, lacking rim edge. Blue/green. Outbent rim, cylindrical neck, tooled junction with slightly expanding tubular body, slight flattening at centre of base. Present height 70mm, height of body 47mm, maximum body diameter 18mm. EVE 1.0. Context 672 sf 6

21 Tubular unguent bottle, rim and neck fragment. Blue/green with streaky green impurities. Outbent rim, edge sheared; cylindrical neck, broken at tooled junction with body. Rim diameter 15mm, present height 25mm. EVE 0.4. Context 672 sf 6

22 Tubular unguent bottle, complete base with joining body fragment. Blue/green. Small part of tooled junction of neck / body; slightly expanding tubular body, slight flattening at centre of base. Present height 43mm, maximum body diameter 16mm. EVE 0.6. Context 672 sf 6

23 Tubular unguent bottle, virtually complete body and base. Blue/green. Small part of tooled junction of neck / body; slightly expanding tubular body, slight flattening at centre of base. Present height 34mm, maximum body diameter 15mm. EVE 0.6. Context 672 sf 6

Cremation Pit fill 694

24 Tubular unguent bottle; rim, neck and part of body in two joining fragments. Blue/green. Outbent rim, edge sheared; cylindrical neck, tooled junction with slightly expanding tubular body. Evidence of deformation by heat including

fire rounding of broken edges. Present height 43mm, rim diameter 18mm. EVE 0.6. Context 694 sf 32

25 Tubular unguent bottle; rim, neck and part of body in two fragments. Blue/green. Outbent rim, edge sheared; cylindrical neck, expanding body lacking base. Deformed by heat so that vessel now flat, some fire rounding of broken edges. Present height 53mm, rim diameter now 19 x 7mm. EVE 0.8. Context 694 sf 32

26 Tubular unguent bottle; neck and part of body in three joining fragment. Blue/green. Cylindrical neck broken where it starts to bent out to rim; tooled junction between neck and expanding body. Present length 28mm, neck diameter 12mm. EVE 0.6. Context 694 sf 32

27 Tubular unguent bottle; neck and part of body. Blue/green. Tooled junction between cylindrical neck and expanding body. Distorted by heat. EVE 0.4. Present length 40mm. Context 694 sf 32

28 Tubular unguent bottle; body fragment. Blue/green. Lower body lacking base. Distorted by heat and now flattened. EVE 0.2. Present height 38mm. Context 694 sf 32

29 Tubular unguent bottle; base fragment. Blue/green. Slightly flattened centrally. Maximum body diameter 25mm. EVE 0.2. Context 694 sf 32

30 Tubular unguent bottle; 9 fragments from bases. Blue/green. EVE 0.6. Context 694 sf 32

31 Body fragments (3). Blue/green. Context 694 sf 32

32 Body fragments (11). Blue/green. All affected by heat ranging from slightly deformed to completely melted. Context 694 sf 32

Cremation Pit fill 1011

33 Unguent bottle, rim fragment. Blue/green. Out-turned rim edge rolled in irregularly. Rim diameter 25mm, present height 5mm. EVE 0.2. Context 1011 sf5

Other contexts

34 Blue/green body fragment 1042 sf40

35 Blue/green melted fragment; possibly from neck and shoulder of bottle. U/S sf 39.

APPENDIX 5

The Roman Coins
by Nick Wells

COINS FROM EXCAVATIONS AT 124-130 AT LONDON ROAD, GLOUCESTER

by Nick Wells

A total of 23 coins were found in excavations at London Road, Gloucester, 22 of which are Roman in date. The exception (coin no. 23) is a late medieval cast lead token. The Roman coins were all copper alloy with the exception of coin no. 3, which is a debased denarius copy consisting of c.25% silver (or less). The date range of the coins spans the whole empire - the earliest (coin no. 1) being a possible as of Nero (AD 54-68) and the latest (coin no. 19) a nummus of Magnentius or Decentius (AD 350-3). However, most of the coins (15 of the 22 Roman) date to the 4th century AD.

In general the assemblage is too small and typical to allow any significant conclusions to be drawn. It should be noted that some coins could circulate well beyond their issue date, while others had a much shorter life. While issues of residuality and intrusiveness mean that coins should not be used to date layers (unless there are sound stratigraphic reasons to do so), coins placed in graves can help very much with their dating, so long as the possible length of circulation is always kept in mind. The degree of wear should not be considered as it likely that any unworn coin found was chosen simply because it was unworn, even though it may have been at the end of its circulation life. There is also the possibility of curation.

A number of coins are worth further mention. Coin 4 (SF7) from grave [4019] has tight issue dates, but would have circulated until at least AD 321, and possibly as late as AD 330. Coins 6-15 (SF's 10i-10x) were all recovered from grave [1012]. These coins, probably the contents of a bag or purse, form a group of common coins, both regular and copies circulating between AD 348 and AD 364. It is very unlikely that they would have been in use after that date. Coin 17 (SF13) was found in the left hand of the skeleton in grave [1083]. This coin, of the usurper Allectus, would not have circulated at all after AD 296, although it is possible that the coin was curated. Coin 18 (SF15) was found in grave [4034], by the right forearm. As with Coin 4 it may have circulated to AD 330 and so could date the grave to AD 310-330. Coin 19 (SF16) was found in grave [4037] and circulated between AD 348-364.

The distribution of the coins tell us little except that all but four come from the western half of the site and that the only specific concentration are three (coin nos 8, 9 & 13) in the northern part of Area 4. One of these (coin no 13) is a result of possible contamination. However the other two (8 & 9) form a very tight group circulating from 310-330. As such it is possible that this part of the cemetery dates to the early 4th century.

The function of the medieval token is not certain. It may have served some limited monetary function as written evidence from France mentions the use of such tokens as attendance tickets handed out to priests who celebrated mass at certain times of the day (Fletcher 2003, 28). They may have been exchanged for food or as toll payments along pilgrimage routes. Whatever it's function it is commonly found at markets and fairs. This particular type is not found in the standard corpus (Mitchiner & Skinner 1984) and as such may be a provincial issue.

LRBC = Carson, Hill & Kent (1978)
RIC = Mattingly et al. eds. (1913-1994)

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Catalogue

The catalogue follows a simple format. After the coin identification number (used in the text of this report) is the site **Special Find** number. The **Issuer** is specified where known, however if it is preceded and followed by asterisks (*……*) then the coin is a contemporary copy of that issuer. The **Denomination** is the name of the coin where known. *Antoniniani, aureliani* and *nummi* are names given to those coins by numismatists for want of any information as to what the Romans themselves called them. The **Issue Period** defines the period in which the coin was minted <u>not</u> the circulation period. The dates are all AD, unless specified differently. The **Reverse Type** is the inscription or figure on the reverse (tails) side of the coin, while the **Mint** is its place of striking. The **Reference** indicates a concordance with entries in the standard catalogues, while the final number is its site **Context**.

No	SF.No	Issuer	Denomination	Issue Period	Reverse Type	Mint	Reference	Context
1	1	*TetricusI*	Antoninianus	275-296	SALVS AVGG		As RIC V ii Tetricus 126/7	134
2	3	Uncertain	Dupondius/As	1st/2nd century	Uncertain			159
3	4	Hadrian	Dupondius	118-119	PONT MAX TR POT CO II SC FORT RED Fortuna	Rome	RIC II Hadrian 557	528
4	7	Constantine I	Nummus	313-314	SOL INVICTO COMITI	London	RIC VII London 5/6	4021
5	9	Uncertain	Denarius	2nd-3rd century	Uncertain			704
6	10i	*Constantius II*	Nummus	348-364	FEL TEMP REPARATIO Phoenix on pyre		As LRBC II 32	1014
7	10ii	Uncertain	Nummus	mid-late 4th century	Uncertain			1014
8	10iii	Uncertain	Nummus	346-348	VICTORIAE DD AVGGQ NN	Trier		1014
9	10iv	Uncertain	Nummus		Uncertain			1014
10	10v	*Theodora*	Nummus	337-348	PIETAS ROMANA			1014
11	10vi	Constantius II	Nummus	346-348	VICTORIAE DD AVGGQ NN	Trier	LRBC I 139	1014
12	10vii	Uncertain	Nummus	mid-late 4th century	Uncertain			1014
13	10viii	*House of Constantine*	Nummus	348-364	FEL TEMP REPARATIO Phoenix on globe			1014
14	10ix	*House of Constantine*	Nummus	346-348	VICTORIAE DD AVGGQ NN			1014
15	10x	*House of Constantine*	Nummus	341-364	Uncertain			1014
16	12	Uncertain	Uncertain	Late 3rd-4th century	Uncertain			655
17	13	Allectus	Aurelianus	293-296	PROVIDENTIA AVG	‘C’ mint	RIC V ii Allectus 108	1085
18	15	Constantine I	Nummus	310-311	SOLI INVICTO	Trier	RIC VI Trier 899	4035
19	16	Constans	Nummus	348-350	FEL TEMP REPARATIO Hut	Trier	LRBC II 29	1014
20	27	Uncertain	Token	14th-15th century	Uncertain			U/S
21	35	*Gallic Empire*	Antoninianus	275-2963005	PAX AVG			590
22	36	*Uncertain*	Nummus	346-364	2 Victories			3005
23	37	*House of Constantine*	Nummus	337-348U/S	GLORIA EXERCITUS 1 Standard			

APPENDIX 6

The Animal Bone
by Juliet Mant

THE ANIMAL BONES FROM LONDON ROAD, GLOUCESTER

Juliet Mant
School of Conservation Sciences
Bournemouth University

A total of 1,168 fragments of animal bone were recovered from excavations at 124-130 London Road, Gloucester. Approximately 30% of these could be identified to species. The following mammals were identified, in order of frequency: cattle; sheep/goat; pig; horse; red deer; roe deer; cat; dog. Bird species represented were domestic fowl, goose, duck (unknown species between mallard and teal size), pheasant and large corvid (crow family). A single unidentified fish bone was found.

All information was recorded onto a database and included the size and preservation of each context and information on the species, element, fusion, butchery, toothwear, measurement and condition of each fragment where possible.

Much of the material was fragmentary with preservation ranging from quite poor to quite good. Some fragments displayed signs of weathering and some had been badly damaged by gnawing. There were also three contexts, which contained calcined bone fragments (Table 1).

Condition	***No. of Frags***
Eroded	60
Burnt	133
Gnawed	18
Fragmented	24
Concretions	5
Modern Breaks	32
Ivoried	1

Table 1 : The condition of fragments from the London Road assemblage

Some dating information was available and there appear to be some differences between the periods (Table 2). For example, during the Roman period pig is more common than sheep/goat whereas in the other periods sheep/goat is more common. However, as the assemblage is so small it was felt that it would not be beneficial to further analyse the periods individually.

The assemblage is dominated by cattle, sheep/goat and pig, the three main domesticates, and there are few wild species represented. This is not unusual and probably reflects the fact that this is an urban site and people tend to rely on the meat available from a local market, which is mostly domestic stock.

Of the sheep/goat bones the majority could not be further differentiated although one skull fragment could be positively identified as sheep. A range of bird bones were

found representing both wild and domestic species. Only one fish bone was present and this could not be identified to species.

There is little ageing information available due to the size of the assemblage, however, where possible mandibles were assigned a Grant (1982) mandible wear stage (MWS) (Table 3) which can then be used to suggest an approximate age at death for the animal (Hambleton, 1999). A single cattle mandible had an MWS of 44, which suggests it belonged to an older adult. All of the pig mandibles were incomplete and so the MWS had to be estimated. The results indicate that most pigs represented were between one and two years old. The only complete sheep/goat mandible is aged between 1-2 years while the others, which had to be estimated could be anything from 1-4 years.

Species	dp4	P4	M1	M2	M3	MWS
Cattle		g	l	k	h	44
Pig		f	f	d	broken	>25
Pig		broken	h	e	broken	29
Pig		c	f	e	broken	>25
Pig	f		worn			
Pig			broken	b	broken	
Sheep/goat		g	g	f	broken	24-33
Sheep/goat		g	g	f	broken	24-33
Sheep/goat		g	broken			
Sheep/goat		broken	h	f	E	27

Table 3 : Toothwear data from the London Road assemblage

Fusion data can also help in the analysis of age (Table 4). The majority of the surviving cattle limb bone epiphyses were fused, suggesting that there were mostly older cattle represented in the assemblage. Those elements which were unfused were generally later fusing bones which take until between two a,nd four years of age to reach maturity (Silver, 1969). The sheep/goat data shows a similar picture with all early fusing elements fused. Although there were a greater proportion of unfused pig bones, they were elements, which fuse later in life.

	Early Fusing		Later Fusing		Latest Fusing	
	Fused	Unfused	Fused	Unfused	Fused	Unfused
Cattle	12		7	2	7	4
Sheep/goat	12		4	2	3	4
Pig	7			2	4	4

Table 4 : Fusion data from the London Road assemblage

This suggests that people were killing animals, which had probably reached at least two years of age and supports the idea of people inhabiting this site depending on

meat from animals raised elsewhere and sold at the markets. The pig results appear to represent younger animals but this is normal as pigs do not have many uses apart from their meat and so are often killed younger than cattle or sheep, which can be used for secondary products such as milk and wool.

Very little metrical data was available from this assemblage (Table 5) and the measurements, which could be taken were often isolated measurements and cannot be used to say much about the animals concerned.

Species	Element	Bp	Bd	Dd	GL	GLl	GLm	SD	Other
COW	AST		32.4			53.4	48.9		Dm - 26.8; Dl - 29.1
COW	AST						56.4		
S/G	AST		16			24			
COW	TIB		51.7	37.7					
COW	TIB		56.4	40.2					
S/G	TIB		22.8	18.9					
S/G	TIB		26	18.8					
S/G	TIB		23	18.3					
COW	MC	46.6							
COW	MC	59						35.7	
HOR	MT		46.4					31	
COW	CAL				143.7				
COW	HUM							32.4	
COW	PAT				55.6				GB - 46.5

Table 5 : Metrical data from the London Road assemblage

A number of the bones from this assemblage showed signs of having been butchered with both chop and knife marks being present. This included 25 cattle bones, 11 sheep/goat, 7 pig, a red deer and goose bone. These marks fit with general patterns expected from the dismemberment and processing of a carcass (Maltby, 1979) although they do not seem to suggest a specialised industry.

Only two pathological bones were noted from this assemblage. One was a cattle radius, which had extra bone growth around the proximal surface. This is likely to be age related and indicates an older animal. The other pathology was noted on a cattle rib and consisted of lots of extra bone growth where the bone had been broken and had healed misaligned.

Two contexts (657 and 681) contained large bones that appear to have been cremated and it is interesting that the only elements, which could be identified to species from these were all of pig. One of these contexts also included a human vertebra although this had not been burnt. It may be that these deposits represent burial goods of joints of meat. However, extensive disturbance was noted across the site and these may represent mixed deposits.

This disturbance may also explain the deposits, which contained both animal and human remains. Indeed, several of the contexts contained pottery of mixed date, which would support this.

Only limited information is available due to the size of this assemblage. It is dominated by the remains of domestic species, particularly cattle, but also sheep/goat and pig, with very few wild species present. The ageing data suggests that the domestic species were being exploited mainly for their meat and that it is unlikely that they were bred on the site as no very young animals were represented. It is possible that many of the bones, which came from contexts associated with human remains are due to disturbance of grave contexts. However, it is interesting that the cremated animal bones appear to contain more pig remains than other species. Overall this assemblage appears to be fairly typical of the area and can be compared with assemblages from the East and North Gates of Gloucester (Maltby, 1983), Bishop's Cleave (Maltby, nd), North Street, Winchcombe (Levitan, 1985) and other small towns in the Cotswolds area (Maltby, 1998).

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APPENDIX 7

Palaeoenvironmental Samples
By Wendy Carruthers

SOIL SAMPLES FROM LONDON ROAD, GLOUCESTER
by Wendy Carruthers

Samples were floated over a 250 micron mesh sieve (flot) using a 1mm mesh to retain the residue. The samples were repeatedly bucket-floated until all charred material had floated off.

A single sample (507) yielded charred cereals.

Context 507. 15ml of fine orange silty flot was recovered, containing occasional molluscs, charcoal fragments, slag fragments and charred plant remains.

The charred plant remains were sorted from the dry flot under a microscope and are detailed below:

Species	No.	Common Name
Triticum aestivum-type	2	Bread-type wheat grains
Avena sp.	1	Oat grain fragment
Unidentifiable	1	Grain fragment
Vicia/Lathyrus sp.	1	Vetch/tare seed
Viola sp.	1	Violet seed

The residue was dried and sorted by eye to check on the efficiency of the recovery; unidentifiable fragments of burnt bone were present, but nothing else.

The remains may represent general domestic waste, perhaps floor sweepings that had been burnt in the stone feature. Low levels of this type of burnt mixed grain and weeds are often found in a range of features around medieval sites. All of the species recorded are commonly found in assemblages of this date.