DRAFT REPORT

The Human Remains from the Kirk of St Nicholas Uniting, Aberdeen

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GUARD

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Chapter 1 Introduction

By Paul RJ Duffy

Background to the Excavation

The Kirk of St Nicholas Uniting is located to the north of present day Union Street, insulated from the everyday hustle and bustle by its surrounding graveyard. First mentioned in a papal bull issued in 1157 by Adrian IV, the church stood as the main focus of Christian worship in the medieval burgh for over 400 years. During this time it was the sole parish church serving the increasingly wealthy burgesses of Aberdeen, and the supporting cast of craftsmen and workers that inhabited the township (Dennison et al 2002, 81). As the burgh became more commercial successful, the church increased in both wealth and status, and following a rebuild in the 15th century it claimed the undisputed title of the largest burgh church in Scotland. After the reformation the building was divided into two distinct spaces, each serving a separate parish. In more recent times, in common with many similar bodies, attendances had declined and the place of the church within the community had become more peripheral and marginalised than at perhaps any other time in its 900 year history.

Faced with this challenge, and driven by a desire to more fully utilise the church space to encourage more frequent use by the local community, changes to the internal architecture and usage of the building were proposed. In 2005 plans for the renovation of the East Kirk were drawn up with the intention of reinvigorating the church's traditional role as a centre of local community life in Aberdeen. These proposals, which focussed on the relatively underused eastern portion of the church were ambitious in scope, and included plans for an upper multi-use community space, a Foyer Restaurant and a basement retail space for a 'Third Word' shop, on the same level as its internationally significant St Mary's Chapel. At an early stage of the proposals, and following the archaeological assessment and evaluation of the proposed development area, it became clear that the work, particularly that which related to the sub floor deposits, would entail significant intrusion into the medieval fabric of the church and the archaeological deposits contained within the present church walls. The development therefore offered a unique opportunity to understand both the biography of the church and its buried parishioners through controlled archaeological excavation.

Funded by the Kirk of St Nicholas Uniting, excavation by Aberdeen City Council Archaeological Unit duly began in January 2006. Organized with public outreach as one of its central remits, the excavation attracted over 14,000 visitors during the 10 months it was open to the public as well as numerous schools visits and a web 'blog' that disseminated the ongoing findings of the excavation worldwide. In total an area of some 20m x 20 m by a maximum of 3.5 m deep was excavated and established four main phases of ecclesiastic development at the site, in addition to valuable evidence relating to prehistoric settlement in the area. Careful planning of the excavation strategy prior to work commencing had allowed for the assembly of a team experienced in the excavation of human remains led by Alison Cameron of Aberdeen City Council Archaeology Unit, and had provisioned for distance support and monthly on site visits by a human osteologist, Paul Duffy of Glasgow University Archaeological Research Division.

The Excavation

In many ways the structural development of the church evidenced through the archaeological remains uncovered reflect the emergence and growth of Aberdeen as a trading burgh from the 12th to the 17th century. The earliest church, provisionally dated to the late 11th or early 12th

century was a small building. It was defined in excavation by the presence of a semicircular apse at the extreme west of the excavation area, and associated with these structural remains were a number of predominantly non-adult burials all of which lay outside of the church walls. Although only a small proportion of this structure was excavated it is clear that the eastern end of this early church was reserved primarily for the burial of infants and children.

In the early 12th century this church was superseded by a larger building measuring 5.8 m wide, of which a 12.8 m portion was excavated. This building was constructed over the top of the earlier remains and increased the internal space enclosed by the church walls. This building appears to have been built over an earlier ditched feature of unknown date and was subject to at least one phase of rebuilding of the eastern gable wall in the later 12th century. Buttressing of the earlier 12th century wall and the later rebuilt wall suggests this may have been necessitated by structural instability, possibly attributable to the presence of the ditched feature. A putative sacristy was also added on the northern side of this church at some point after the construction of the 12th century church. Although it was possible to associate several of the burials with particular phases of the buildings history, the vast majority of individuals could be assigned only to a broader 12-15th century range by the excavator. What is clearer, ands perhaps somewhat surprising is that burials were only present at the exterior of this church as well.

In the 15th-century church this church was in turn demolished and a much larger building erected, mirroring the rising wealth of the burgh inhabitants. This building included at least two private chapels, the most famous of which, dedicated to St Mary of Pity, also served as a vault for the Gordons of Aberdeen. The rebuilding also greatly expanded the capacity and enhanced the reputation of the church making it the largest burgh church in Scotland in the 15th century. Burials from this period came exclusively from the interior of the church as excavation revealed that the 15th century walls have been reused in the subsequent 19th century rebuild of the east Kirk.

With the arrival of the reformation in Aberdeen, the church was split into two separate kirks, east and west, although evidence from the excavation clearly demonstrates that burial in the east Kirk continued into the seventeenth century. This observation reinforces documentary evidence which indicates that burial within the church was formally prohibited in a council edict of 1647 aimed at preventing plague recurrence. It is probable that the latest burials in the assemblage date from around this time (Dennison et al 2002, 81).

The Skeletal Assemblage

At the end of the excavation 939 separate skeleton numbers had been assigned and over 3.5 metric tonnes of disarticulated material recovered. Subsequent post excavation analysis both in Aberdeen and Glasgow refined the total number of individual burials recovered to 897. The assemblage thus represents the largest single collection of individuals excavated from any Scottish medieval burgh, and offers a unique opportunity to study the physical remains of a large secular burial population from the medieval period in Scotland. As such the results of the analysis offer the opportunity not just for comparison and contextualization within the currently known skeletal information from Scotland but also with the larger English medieval cemetery populations. This potential is important in allowing a further alternative study which contrasts both in geographical location and economic circumstance with the currently dominant English based research literature in the field of medieval burial archaeology.

The significance of the burial assemblage is further enhanced by the relationships established between many of the burials and the chronological phases of church use as identified archaeologically. Associated burials could thus, for the most part, be assigned to a relative

chronological phase offering a valuable opportunity to examine changing trends in the burial population from the church over time. Although some of the phases of burial produced small samples of individuals a broader phasing schema has been developed in this report which allows contrast in changing patterns of skeletal data between the pre 15th century and post 15th century. The potential value for his work was significantly enhanced by a wealth of detailed historical and archaeological work examining the development of the burgh, which has been undertaken in the past 3 decades (Dennison and Stones 1997; Cameron and Stones 2001; Dennison et al 2002). As a resource, the value of the material is therefore clearly of international significance and it is anticipated that the results of the analysis will be of interest to the professional and non professional community of individuals interested in the lives and deaths of medieval Scottish burgesses.

Analysis Methodology

The analysis methodology and recording criteria followed currently defined standards as described in Buikstra and Ubelaker (1994) with careful consideration of guidelines produced for the standard analysis of skeletal remains in Britain as detailed in Brickley and McKinlay (2004). The report details specific methodological issues or considerations at various points throughout the text and the reader referred to these for more detailed information. Several general methodological procedures are, however, worth outlining at this point.

Recording

Recording of information relating to each individual skeleton was carried out on a specifically designed pro-forma paper record sheet. Direct input into a specifically designed human remains database such as that developed by MOLAS was considered but rejected on several grounds. Most significantly, the relative advantage of direct database entry over paper recording in terms of maximising the resources available to the project was difficult to quantify, and previous experience suggested that any advantage in analysis also brought corresponding disadvantages in terms of time resourcing and data reliability. Additionally, concerns existed as to the process through which a reliable audit of inputted data could satisfactorily be achieved. Instead the data from the paper sheets was manually inputted following the completion of the analysis into a series of Microsoft Excel spreadsheets. A relational database was then produced for those sections of data for which it was felt useful to employ this analysis tool. Other data analysis was undertaken directly from Excel. Full paper and electronic records will be archived back to Aberdeen City Council Archaeology Unit.

Age at Death

Methods used for determining age at death were in accordance with those outlined by Buikstra and Ubelaker (1994), Krogman and Iscan (1986) and Scheuer and Black (2000). In immature individuals, dental development and stages of epiphysis fusion were the primary methods used. Metric data was taken and assessed for age indicators but the inherent problems of nutritional affect on long bone length meant that this method was used with caution. Tooth age was primarily derived from Ubelaker and was supplemented by assessment of individual teeth formation stage as defined by Smith 1991. Long bone length was derived from standards put forward by Maresh (1970) and others and reproduced in Scheur and Black (2000).

Where maturity was complete and where possible, the appearance of the auricular surfaces of the illium and the pubic symphysis were the primary methods of ageing employed. These were supplemented by examination of the sternal end of the fourth rib where present. Dental development and cartilage ossification were also examined and recorded, as was dental

attrition. The inherent problems with utilising the latter method meant that this was not used as a sole indicator of age. Cranial suture closure was not considered.

The problems with various ageing techniques are, however, well known. In order to address these and to provide reliable groups on which to base the analysis the following wider age criteria were employed, following criteria set out in Buikstra and Ubelaker (1994)

Feotus	Under 28 weeks in utero
Perinate	28 weeks in utero to 3 months
Infant (INF):	3 months – 3 years
Child	3 years to 12 years
Adolescent	13 years to 18 years
Young Adult (YA):	18 to 35 years
Mature Adult (MA):	35-50 years
Older Adult (MTA):	Over 50 years
Adult	Any adult of indeterminate age
Non Adult	Any non-adult of indeterminate age

Biological Sex

Assessment of biological sex was based on the visual differences in male and female pelvic and cranial morphology (Buikstra and Ubelaker 1994), supplemented by metrics taken from various long bones joint surfaces (Bass 1995). Final determination of sex as detailed in the following report was given only when it could be satisfactorily resolved. Where any such designations were judged to be unsafe, the biological sex of the individuals was left as unknown. There are currently no non destructive analysis techniques for reliably determining the sex of juveniles and so no such determination was attempted.

Stature and metrics

Stature was estimated by measuring the long bones and applying standardised regression formulae utilising the rank order of accuracy as outlined in Brickley and McKinlay (2004). These calculations are based on data derived from white American modern males and females as no such data has yet been compiled for European archaeological populations.

Standard cranial and post-cranial metrics were recorded according to guidelines in Brickley and McKinlay (2004). These have been archived as part of the electronic archive and are also available for consultation in the primary paper record.

Non Metrics

Cranial and post-cranial traits were recorded according to the extensive list detailed in Buikstra and Ubelaker (1994) and supported by Brickely and McKinlay (2004).

Pathology

Diseases and traumatic injuries were classified according to cause with reference to a number of texts primarily Aufderheide and Rodriquez-Martin (1998), Ortner and Putschar (1981) Roberts and Manchester (1997) and Galloway (1999)

Chapter 2 The skeletal assemblage

By Paul RJ Duffy

Number of Individuals and Phasing

In total 917 separate skeleton numbers were issued during the course of the excavation and immediate post-excavation work on the assemblage from St Nicholas. Subsequent refinement of the burial catalogue identified 18 examples where two individuals were represented by a single skeleton number and these were subsequently distinguished by the letter A and B. A further five foetal burials were also identified from the analysis of the disarticulated material (discussed below) but were unphased. In 33 instances issued skeleton numbers had no associated physical remains or record at analysis stage, either due to poor skeletal condition precluding the successful lifting and processing of the bone, or more frequently where an issued skeleton number during excavation had not been subsequently associated with a set of human remains. A further 10 instances of equivalences were identified. The total number of inhumations analysed and on which this report is based is therefore 897 individuals of which 879 are phased burials. The number of inhumations examined from each phase of the cemetery is shown in Table 1 below.

Phase	Date range	Number of Individuals
1	Early 12th Century	45
1-2	Early-mid 12th Century	16
1-3	Early 12th-15th Century	12
2	Mid 12th Century	3
2-3	Mid 12th-15th Century	335
2-4	Mid 12th-18th Century	58
3	Late 12th-15th Century	67
3-4	Late 12th-18th Century	2
4	15th-18th Century	341
	Unphased	18
Total		897

Table 1 Number of inhumations by phase

The use of this particular phasing schema for analysis of the assemblage did produce some larger (and therefore statistically useful) groups of individuals, with phase 2-3 and phase 4 immediately noticeable. However, it quickly became apparent that utilising this scheme for examining the population from St Nicholas for any temporal trends changes had significant limitations. Firstly, some of the phases contained low numbers of individuals, reducing the information that could be reliably be deduced from these groups. In particular, phase 1-2, phase 1-3, phase 2 and phase 3-4 were judged unlikely to produce statistically meaningful result in comparison with some of the larger groups of individuals. This problem was compounded by inconsistencies in the demographic makeup in some of the sub-groups due to the relationship between the key structural features in which they were found and the excavation geography dictated by the development. Phase 1, for example, was found to comprise 80% non adults (n=47), an obvious bias when compared to the complete burial population from this time, and which was undoubtedly due to the limited portion of the early 12th century church that was subject to excavation. Whilst these observations are undoubtedly of significance in understanding particular aspects of medieval burial practice, such biases did not lend themselves well to the statistical analysis of trends of demographics, health and metrics through time. In addition, under this schema several phases would have needed to be

excluded from comparative analysis as they spanned multiple phases. Whilst this action was inevitable no matter how the burial assemblage was broken down, a revised and lower resolution phasing was considered a better alternative to explore changes in the population through time.

In order to smooth the data and to better assess the changing life patterns of the burgh inhabitants through time it was judged more appropriate to explore the differences in the burial assemblage by utilising a less nuanced, but ultimately more informative, phasing schema. This divided the burial population into two broad phases, a 12th to 15th century group who lived during the early emergence and initial development of the burgh into a significant trading port, and a 15-18th century group who lived in the period when the burgh was a more established and thriving centre in the region. Under this new schema, 60 individuals from phase 2-4 and 3-4 were excluded from statistical analysis. Overall, it was felt that this approach presented much more satisfactory groupings for both intra- and inter- site comparison of metric data etc. The more refined phasing of the site was reserved to understand specific research questions relating to particular aspects of the assemblage. The revised groupings are shown in Table 2 below.

Phase	Date range	Number of Individuals
A	12th-15thCentury	478
B	15th-18th Century	341
Total		819

Table 2 Revised phasing

Throughout this report, breakdowns of the population have been given per phase to provide complete reporting on the assemblage. However, statistical significance tests have only been applied to that proportion of the population which can be definitively categorised as either belonging to Phase A or Phase B. The comparative information is thus based on the lower total of 819 individuals.

Condition of the Skeletal Material

At the start of each skeletal examination each individual bone present was recorded graphically on a summary sheet. This formed the basis for estimation of the percentage completeness for each set of skeletal remains. At the same stage in analysis, the condition of the cortex was assessed and placed into one of three categories, good, average or poor. As with any such observation this categorisation is ultimately subjective and in some regards represents a reflection of the condition in relation to the rest of the assemblage. It does, however, provide a useful measure of how intact or eroded the cortical bone was on each set of skeletal remains when presented for analysis.

Phase	*n*	Percentage completeness				Cortex Condition		
		+75%	-50%	-25%	-0%	G	A	P
1	*45*	49%	16%	18%	18%	49%	27%	24%
1-2	*16*	25%	13%	19%	44%	56%	38%	6%
1-3	*12*	175	8%	17%	58%	33%	33%	33%
2	*3*	33%	0%	33%	33%	0%	0%	100%
2-3	*335*	36%	59%	75%	80%	66%	32%	3%
2-4	*58*	34%	14%	14%	38%	67%	33%	0%

3	*67*	49%	22%	13%	15%	82%	16%	1%
3-4	*2*	0%	0%	0%	100%	0%	100%	0%
4	*341*	26%	15%	23%	36%	49%	34%	17%
Total	*879*	33%	16%	21%	29%	59%	31%	10%
A	*478*	38%	18%	21%	24%	65%	29%	6%
B	*341*	26%	15%	23%	36%	49%	34%	17%
Total	*819*	33%	16%	22%	29%	58%	31%	11%

Table 3 Percentage amount of skeleton present and cortex condition by phase

In almost exactly half of the inhumations the skeleton was found to be over 50% complete, and, more significantly, in one third of the inhumations the skeleton was over 75% compete, constituting the largest single group in terms of completeness. Conversely the second highest grouping was in the 0-25% completeness range suggesting that inhumations were either very completely or very incompletely preserved (see Table 3). At St Nicholas the size of this latter group, is however, as much a reflection of disturbance of graves by later activities such as burial and later church construction as it is of how soil conditions have affected skeletal preservation. This observation is supported by the observed cortical condition of the bone under analysis which was rated as good in 59% of individuals and poor in only 10% of individuals.

Inevitably, there was variation between phases in both skeletal completeness and cortical preservation, although no significant pattern could be distinguished in comparisons between phases 1-4. When utilising the revised phasing of phase A and phase B it was, however, interesting to note that overall, both percentage completeness and cortex condition declined between the earlier and later phases. This can be most readily attributed to two factors: an increased intercutting of graves from the 15th century phase of the church onwards and a 15th century levelling layer constructed as part of the church reconstruction which appears to have protected those earlier burials below.

Age	**n**	**Percentage completeness**				**Cortex Condition**		
		+75	**-50**	**-25**	**0**	**G**	**A**	**P**
F	15	40%	13%	33%	13%	93%	7%	0%
PERI	35	29%	20%	26%	26%	86%	11%	3%
I	175	31%	15%	22%	31%	57%	34%	10%
C	173	38%	13%	23%	27%	66%	28%	6%
AD	26	37%	22%	15%	26%	44%	37%	19%
NON A	1	0%	0%	0%	100%	0%	100%	0%
YA	102	49%	27%	19%	6%	69%	27%	4%
MA	141	52%	20%	23%	5%	57%	35%	7%
OA	23	48%	17%	26%	9%	57%	35%	9%
A	202	6%	10%	21%	63%	47%	35%	18%
N/O	4	0%	0%	0%	100%	0%	25%	75%
Total	897	32%	16%	22%	30%	59%	31%	10%

Table 4 Percentage amount of skeleton present and cortex condition by age

In assessing the condition of the material in relation to age at death of individuals it was clear that some correlation could be made between percentage completeness and age, with adults being generally better preserved than non adults in terms of both completeness and cortical

condition (Table 4). Notably as the percentage completeness of adult skeletons decreased then so did the reliability of age assignation with the majority of un-aged adults also the least completely preserved. Interestingly, however, the identification of infant ages was much less affected by this, perhaps owing to the multiple potential ageing criteria available for estimating non-adult age.

Sex	n	Percentage completeness				Cortex Condition		
		75	-50	-25	0	G	A	P
F	125	50%	19%	20%	10%	60%	36%	4%
?F	36	31%	8%	31%	31%	47%	42%	11%
?	123	2%	4%	11%	82%	50%	30%	20%
?M	54	28%	31%	31%	9%	37%	39%	24%
M	141	42%	23%	26%	10%	63%	30%	6%
Total	477	31%	17%	21%	30%	55%	34%	12%

Table 5 Percentage amount of skeleton present and cortex condition by sex

In terms of biological sex, typically expected patterns were observed in relation to preservation. In general there was no significant difference between either percentage completeness or cortex condition, and as overall preservation of the skeletal material increased, so did identification of biological sex (Table 5).

Age and sex

The analysis of the assemblage by age and phase revealed some interesting trends in the ageing data. Overall over three-quarters of the burial population could be assigned to a specific age category (Table 6). The remaining individuals, identified only as adult or non-adult, were mostly representative of poorly preserved and fragmented or disturbed inhumations. Almost half of the population comprised non-adult individuals with one quarter aged under 3 years old. This high mortality in childhood is a common feature in pre modern British archaeological populations and is indicative of the changes that improved obstetric and post-natal care have had on modern populations. It should be remembered, however, that this is not an indication of infant mortality rates, but rather reflects the prevalence of non-adults in the burial assemblage.

Phase	*n*	F	PERI	I	C	AD	NONA	YA	MA	OA	A	NO
1	*45*	2%	9%	44%	18%	4%	2%	2%	7%	0	9%	2%
1-2	*16*	0	0	6%	19%	0	0	13%	19%	0	44%	0
1-3	*12*	0	0	8%	8%	0	0	0	25%	8%	50%	0
2	*3*	0	0	33%	0	0	0	33%	0	0	33%	0
2-3	*335*	1%	4%	17%	25%	3%	0	14%	15%	3%	17%	0
2-4	*58*	0	3%	22%	29%	7%	0	9%	12%	0	17%	0
3	*67*	1%	3%	25%	22%	3%	0	7%	25%	3%	9%	0
3-4	*2*	0	0	0	0	50%	0	0	0	0	50%	0
4	*341*	1%	4%	19%	13%	2%	0	11%	17%	3%	29%	1%
Total	*879*	1%	4%	20%	20%	3%	0	11%	16%	3%	22%	0
A	*478*	1%	4%	20%	23%	3%	0	12%	16%	3%	17%	0
B	*341*	1%	4%	19%	13%	2%	0	11%	17%	3%	29%	1%
Total	*819*	1%	4%	20%	19%	3%	0	12%	16%	3%	22%	0

Table 6 Percentages of individuals in each age category by phase

When analysed according to phase, it is also clear that excavation bias has introduced some potentially significant skewing of the data, particularly in those phases that contain fewer numbers of inhumations. Thus data from phase 1, for example, suggests a population from this period comprised 80% non-adults and 20% adults. This is clearly an unrealistic ratio and serves more as a useful and stark reminder of how small burial populations can reflect the bias of excavation more than the burial population in the cemetery

As discussed above, utilisation of an alternative schema of phasing during analysis was judged much more satisfactory and was considered to help iron-out some of the wrinkles in the dataset under examination. From this data it was clear that some variability is apparent between phase A and phase B, although in terms of overall percentages of population, the pattern of age at death of individuals is remarkably consistent between the earlier and later phases. It is also of note that this trend is echoed in the calculation for the assemblage as a whole

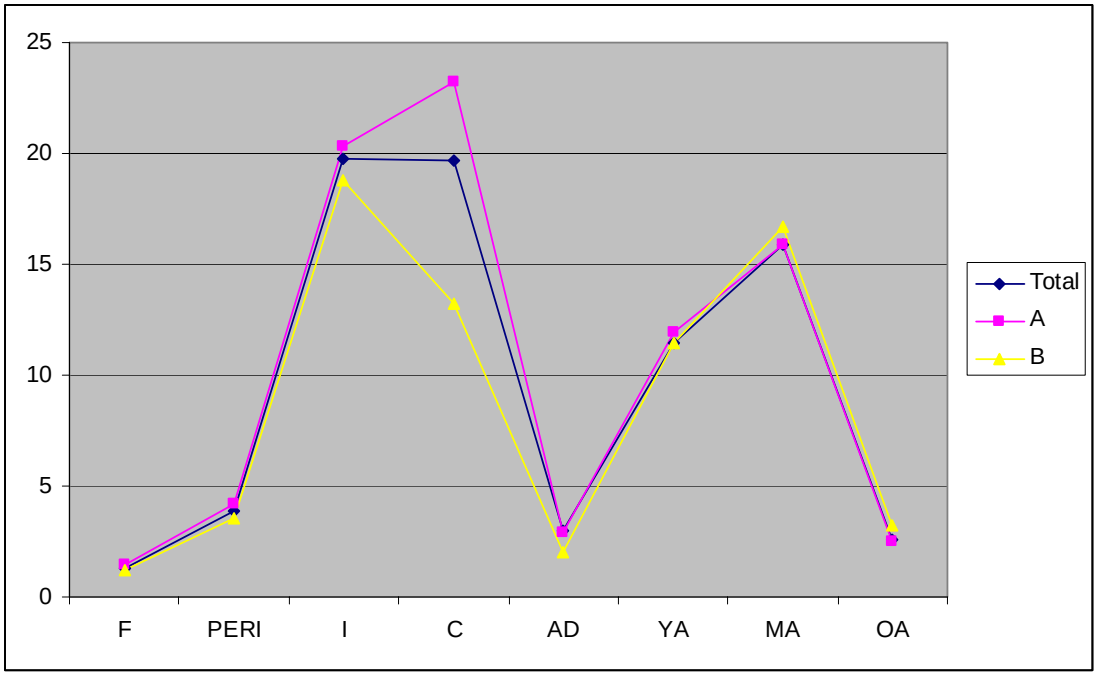

Table 7 Percentages of individuals in each age category by phase

As can be seen from the graph above (Table 7) the relative proportions of deaths in adulthood are broadly similar in both phases. The prevalence of burials of those under 3 years as a percentage of the overall population is substantive, and whilst particular local trends such as that seen in phase 1 may have some influence on the slightly higher number of infant deaths in phase A, it is clear that the trends between the phases are similar with the likelihood of death lowest in adolescence before rising sharply in young and then middle adulthood. Only 3% of the population are in the old adult category suggesting a low probability of survival past the age of 50. One particular discrepancy that stands out is the decreased proportion of child deaths that appear in the burial population in phase B. Although some bias has been noted in relation to the number of non-adults present in phase 1, this alone cannot explain this trend. The variation suggests a change has occurred in factors related to child deaths between the early and later development of the burgh, which has resulted in an increased potential for survival into adulthood. Interestingly, this trend is not carried through into adulthood with the

proportion of adults recorded in the young and middle adult category being broadly similar in both phases, perhaps lending strength to a change in the circumstances of childhood alone.

Phase	*n*	M	?M	?	?F	F	M:F
1	*9*	2	3	2	1	1	2.5:1
1-2	*12*	3	0	5	1	3	0.75:1
1-3	*10*	4	0	4	0	2	2:1
2	*2*	0	2	0	0	0	n/a
2-3	*169*	58	22	30	11	48	1.36:1
2-4	*22*	3	2	6	4	7	0.36:1
3	*28*	11	4	1	1	11	1.25:1
3-4	*1*	0	0	0	1	0	n/a
4	*193*	56	18	66	1	52	1.40:1
Total	*446*	137	51	114	20	124	1.31:1
A	*232*	79	31	43	14	65	1.39:1
B	*209*	56	18	66	17	52	1.07:1
Total	*441*	135	49	109	31	117	1.24:1

Table 8 Percentage of individuals of known sex by phase

When the sexual division of the assemblage is analysed (Table 8) the male to female ratio shows variation in individual phases, which, like the age ratios, is likely to relate to variations in the geography of the excavation in relation to structural features. Overall, for the 348 burials that could be sexed the male to female ratio for all sexed burials equal to 1.31:1 in favour of males. This ratio is unsurprising and is broadly consistent with the observed tendency in any analysis to bias sex estimation towards males. This trend remains broadly consistent for all of the early phases but, interestingly it drops between phase A and phase B from 1.39: to 1.07: in favour of males. The possible reasons for this are discussed later, but it apparently suggests that some form of selection towards females was occurring either in terms of mortality rates, or population, or burial location post 1500.

Chapter 3 Physical characteristics of the assemblage

By Paul RJ Duffy

The physical characteristics of the assemblage have, for the purposes of this report, been defined as those characteristics that have been assessed thought the analysis of metric data recovered from the skeletal material. This data was recorded according to measurement standards as outlined in Buikstra and Ubelaker 1994 and was based on the suggested metric recording criteria as outlined in Brickley and McKinlay (2004).

Stature

The significance of estimation of stature in a population lies in the demonstrated link between final achieved height and nutritional status. It is well documented that achievement of growth potential is dependant on sufficient dietary intake. Thus variations from this genetic maximum potential are related to variations in the quality and quantity of food intake during the growth period of the human skeleton. Such variations can thus perhaps allow us to make inferences within population phases and between populations. Stature for the St Nicholas assemblage was estimated using standard regression equations as defined in Brickley and McKinlay 2004 which were in turn derived from the US samples studies by Trotter (1970) and Trotter and Gleeser (1952, 1958, 1977). More recent guidelines by Brothwell and Zakrzewski (2004) recommend undertaking assessment of stature based on a ranked approach, by identifying the formula with the lowest error margin in relation to the long bones available for measurement.

Element	n	Mean (cm)	SD (cm)	Min (cm)	Max (cm)
Femur	95	45.1	2.79	36.4	51.9
Fibula	33	35.3	1.68	32.1	39.6
Tibia	85	36.2	2.29	30.4	42.9

Table 9 Male long bone lengths utilised for stature calculations

Element	n	Range (cm)	Mean Stature (cm)
Femur and Tibia	71	151-186	169+/-2.99
Femur	94	149-184	169+/-3.27
Fibula	33	157-177	164+/-3.29
Tibia	85	156-187	170+/-3.37

Table 10 Male stature by ranked preference (Brothwell and Zakrzewski 1994)

As can be seen from Tables 9 and 10, utilising this approach demonstrated that calculated estimates of mean height for males were generally in agreement for the various regression equations, and calculated to be around 170 cm. Only when sample numbers were significantly lower was there notable variation from this estimate, as was the case for calculation of stature from fibula length alone. Again this finding reinforces one of the known problems with skeletal analysis, that lower sample numbers will result in skewed data, and information gained from small assemblages must be treated with caution.

Element	n	mean	SD	Min	Max
Humerus	80	28.9	1.32	25.4	33.1
Femur	77	40.9	2.12	35.8	45.8
Fibula	37	32.5	1.86	28.2	36.5

Tibia	77	33.2	1.59	28.5	37.0

Table 11 Female long bone lengths utilised for stature calculations

Element	n	Range (cm)	Mean Stature (cm)
Humerus and Femur and Tibia	35	143-167	155.79+/-3.51
Femur and tibia	66	144-168	156.11 +/-3.55
Femur and tibia (2)	66	144-168	156.21+/-3.55
Fibula	37	142-167	154.82 +/-3.57
Femur	82	143-167	155.12+/-3.72

Table 12 Female Stature by Ranked preference (Brothwell and Zakrzewski 1994)

A similar pattern to men can be observed in relation to female stature where again, the majority of stature calculation are in broad agreement (see Tables 11 and 12). Interestingly the population groups for combined measurements of humerus, femur and tibia and for fibula alone are of similar size (n=35, n=37 respectively) but it is the single measurement that shows the most divergence from the other calculations. This reinforces the value of multiple measurements for the calculation of female stature and again provides reminder that small samples often lead to significant errors in data calculation.

Having established the reliability of the various calculation methods it was decided that order to provide consistent comparison, a single method common to both sexes should be pursued. Accordingly the following analysis (Table 13) is based on stature calculations based on the length of the femur only. The femur was chosen as it is the most consistently preserved long bone in the body and is often utilised by other researchers (ie Powers 2008).

	Males				Females			
Phase	***n***	**Mean (m)**	**SD**	**Range**	***n***	**Mean (m)**	**SD**	**Range**
A	*50*	1.68	0.11	1.48-185	*40*	1.54	0.06	1.45-1.66
B	*42*	1.70	0.08	1.54-1.82	*35*	1.56	0.07	1.43-1.67
All	*94*	1.69	0.11	1.48-1.85	*82*	1.55	0.06	1.43-1.67

Table 13 Male and female stature (femur) by phase

In total 176 adult individuals had femoral measurements suitable for calculation of stature, around 48% of the total adult population from the site. Initial analysis of the population was based on age and phase and what is immediately clear is the consistent trend towards increased height from phase A to phase B for both males and females. Although these changes are small, and sample sizes perhaps more limited than is ideal, there is a definite indication that an increase in overall mean stature as calculated from the femur can be seen between the earlier and later phases of burgh development. In order to further test this finding, the relative percentages of the stature of individuals was plotted (Tables 14 and 15).

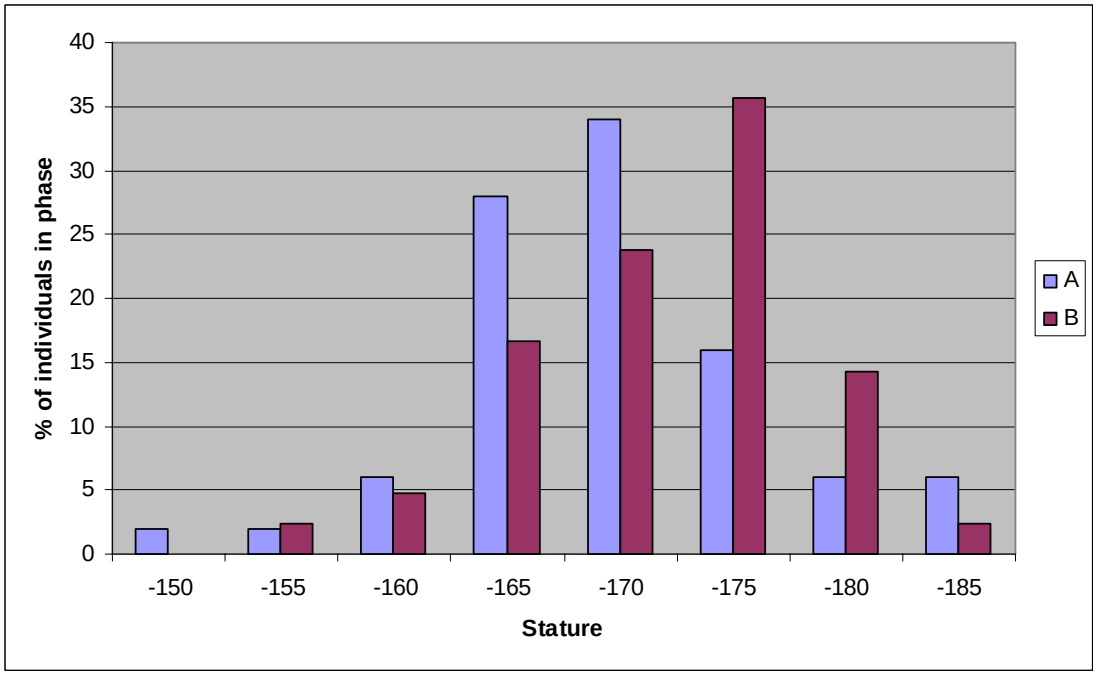

Table 14 Male height in phase A and B as percentage of population% (n=92)

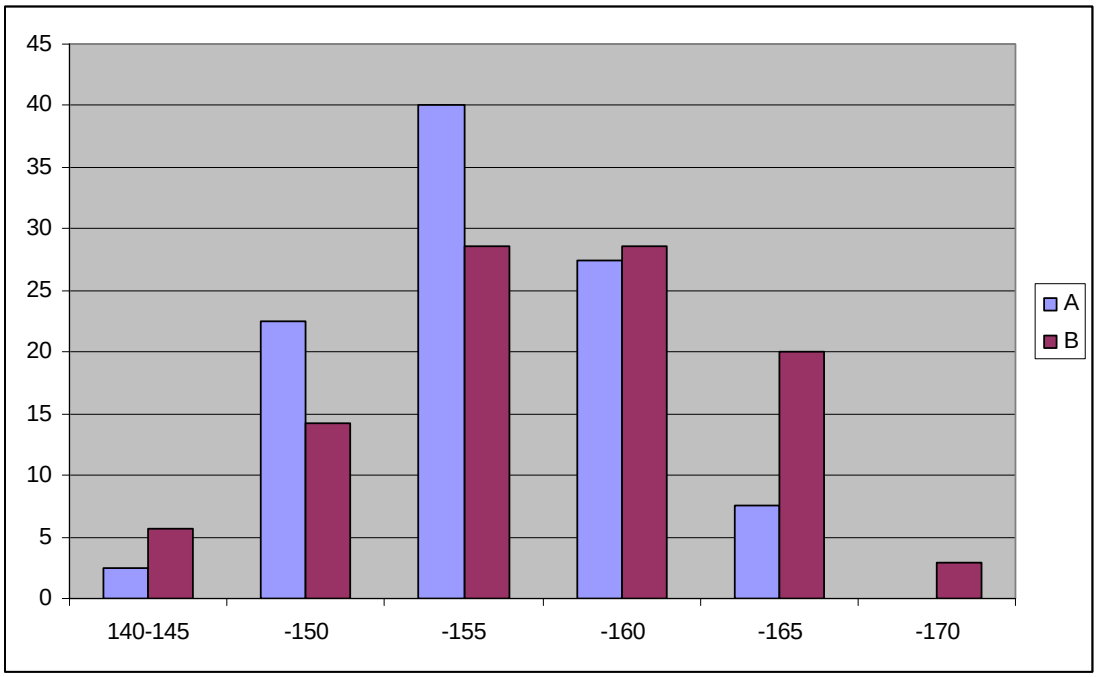

Table 15 Female height in phase A and B as percentage of population % (n=75)

The above graphs demonstrate that the trend towards increased height in phase B is also visible when individuals are grouped into notional categories based on 0.05 m height increments, with a higher percentage of both males and females achieving a greater height in the later burial phase compared to the earlier phase. This trend is particularly noticeable in the male population where the numbers in each incremental height reflect a trend towards an increased overall stature between phase A and B.

Phase	Young Adult				Middle Adult				Old Adult			
	n	Mean (m)	SD	Range	n	Mean (m)	SD	Range	n	Mean (m)	SD	Range
A	21	1.69		1.48-1.85	23	1.68		1.55-1.85	3	1.62		1.59-1.65
B	8	1.73		168-182	23	1.70		1.54-1.79	3	1.71		1.66-1.79
All	30	1.70		1.48-1.85	46	1.69		1.54-1.85	6	1.67		1.59-1.79

Table 16 Male stature by age category

Phase	Young Adult				Middle Adult				Old Adult			
	n	Mean (m)	SD	Range	n	Mean (m)	SD	Range	n	Mean (m)	SD	Range
A	15	1.55		1.49-1.62	19	1.54		1.45-1.66	4	1.54		1.46-1.60
B	14	1.56		1.45-1.64	17	1.56		1.43-1.67	1	1.51		1.51
All	31	1.56		1.45-1.64	44	1.54		1.43-1.67	6	1.53		1.46-1.60

Table 17 Female stature by age category

In order to try and further understand this increase in height populations for phase A and phase B were analysed in relation to age and sex (Tables 16 and 17). Here the results were more tentative, with findings constrained by the small sample sizes available for individuals for whom age and stature could both be calculated. A similar trend towards increased height between phase A and phase B can however also be observed across all age categories, with the exception of older adult females. This apparent anomaly can be explained by the sample size (n=1) for older adult females from phase B.

Clearly a trend can be seen for the post-15th century adult burial population which achieved a slightly increased stature than their pre 15th century counterparts.

This analysis also shows up a trend towards reduction in stature as age increases, suggesting that the maximum achieved height of individuals generally occurred by the age of 35. This is a not uncommon finding in skeletal populations and represents the effects of age related degeneration of the skeleton on stature.

Metric indices

A number of indices can be calculated from metric data from the adult human skeleton. For this report, cranial femoral and tibial indices have been calculated as the most readily comparable with other sites.

Cranial Index

Cranial indices are calculations derived from the length and breadth of the skull. In essence they describe the roundness or elongation of the skull shape. A cephalic index of 100 describes a perfectly round skull and as the skull shape becomes elongated so the index drops. Although popular in the late 19th and early 20th century cranial measurements have largely fallen out of fashion in recent times largely as a result of their association with the eugenics and fascist movements of the 20th century. Studies such as Brothwell 1981 have, however

suggested such measurements may be used to chart differences between skeletal populations and possible migration influences. Their significance therefore remains open to debate.
Cranial measurements were taken with reference to *Standards for Data Collection from Human Skeletal Remains* (Buikstra and Ubelaker 1994). The following criteria were used:

Dolichocephalic <75
Mesocephalic 75-80
Brachycephalic 80-85
Hyperbrachycephalic 85+

	Phase	n	<75	75-80	80-85	85+
Female	A	20	10	25	40	25
	B	11	18	64	18	0
	All	33	12	42	30	15
Male	A	31	10	55	32	3
	B	13	15	46	23	15
	All	46	11	50	30	9
Total	A	51	10	43	35	12
	B	25	16	56	20	8
	All	80	13	48	30	10

Table 18 Cranial index by phase and sex

In total, 80 skulls were available from the St Nicholas assemblage to calculate cranial indices from (Table 18). This resulted in low sample sizes for most of the categories examined. Some trends are however, evident from the analysis. Overall skull shape generally falls into the mesocephalic range for both males and females from both main phases of the assemblage, although females in phase A tend towards slightly rounder skulls and in phase B tend towards slightly longer skulls. Conversely males in phase B tend towards more rounded skulls than men in phase A.

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Femoral Index

Standard measurements of the proximal midshaft of the femora were made in order that femoral index could be calculated (Table 19). The index measures the degree of anterior-posterior flattening at a point on the upper portion of the femoral shaft. A perfectly rounded shaft is described with an index of 100 and as the shaft becomes less rounded, so the index decreases. The extent of flattening is thought to be related to physical activity (Brock and Ruff, 1988), although several other hypotheses have also been put forward, such as mineral or vitamin deficiency (Waldron 2006). Standards used were after Bass (1995).

	SkPhase	*n*	60-	70-	80-	90+
Female	**A**	*57*	9	53	32	7
	B	*45*	11	22	40	27
	All	*112*	9	42	35	14
Male	**A**	*62*	11	48	27	7
	B	*52*	19	33	38	27
	All	*117*	6	35	31	14

All	**A**	*120*	10	50	30	10
	B	*104*	5	20	36	39
	All	*237*	7	38	33	22

Table 19 Femoral index by phase and sex

From the tables above it is clear that the proportion of individuals who tend towards more rounded femora increases between phase A and phase B. This pattern is repeated for both males and females across phases and fits with a generally reported trend for rounding of femora to increase with time.

Tibial Index

Standard measurements of the midshaft of the tibia were made in order that the tibial index could be calculated. The index measures the shape of the tibial shaft but as the point of reference, the position of the nutrient foramen, is not fixed, is utility is open to debate. A perfectly rounded shaft is described with an index of 100 and as the shaft becomes less rounded, so the index decreases. As with the femur, several hypotheses have also been put forward, such as muscular action and posture (Waldron 2006). Standards used were after Bass (1995).

	SkPhase	**n**	**60-70**	**70-80**	**80-90**
Female	A	49	27	59	14
	B	47	11	60	30
	Total	97	22	62	23
Male	A	53	41	64	2
	B	44	23	57	8
	Total	102	32	63	5
All	A	114	29	63	7
	B	120	18	65	22
	Total	250	26	61	14

Table 20 Tibia index by phase and sex

As with the femoral index, a general trend is clear from Table 20 for an increased tendency towards more rounded tibial shape between phase A and phase B. Again this trend can be seen for both males and females and also fits a generally reported trend in British skeletal populations.

Chapter 4 Non-metric characteristics

By Paul RJ Duffy

Non-metric traits are skeletal variants that cannot be recorded through direct quantifiable measurement. Instead, the recognition of each non-metric trait is recorded through a definition of either presence or absence at each location at which they are potentially observable. Much debate exists as to the origins of such variations and undoubtedly the multivariate nature of the traits is due to a variety of influences on the human skeleton from the point of conception onwards. There is, however, a general acceptance that such traits are either genetically or environmentally determined although the precise understanding of the strength and nature of these influences is unclear (Roesing 1984). As such, various studies have suggested that they may be of use in understanding such things as population affinities, family relationships or specific activities or occupations (ie Saunders 1989; Kennedy 1989).

The study of non-metric traits has a long history in the historical traditions of skeletal analysis in the UK but has more recently fallen out of fashion (Brothwell and Zakrzewski 2004, 27). It is, however, still generally accepted that the recording of such traits is worthwhile (ibid) and has a variety of potential uses, most notably in inter- and intra-population comparisons where careful recording of traits can be demonstrated to have been consistently applied to an accepted common standard. A significant number of such traits have been identified and defined (ie Berry and Berry 1967, Finnegan 1978, Hauser and De Stefano 1989, Saunders 1989, Buikstra and Ubelaker 1994, and Tyrrell 2000). The question of which non-metric traits should be recorded and to what level is one which has, however, prompted a variety of suggested approaches, and accepted standardisation of recording level still remains open to individual specialist discrimination.

For the St Nicolas assemblage cranial and post-cranial traits were recorded according to the extensive list detailed in Buikstra and Ubelaker (1994) and supported by Brickley and McKinlay (2004) (see Tables 21-23). This record forms part of the site archive. A brief review of the most readily comparable assemblages (ie Stones et al 1989; James 2008) and recent wider publications of skeletal assemblages (eg Brickley et al 2006; Waldron 2006) reveals a variety of methodological approaches to the presentation of such data. Often, only specific traits are reported on with others confined to the site archive (ie Roberts Dundee; Henderson 2006) or traits are not reported on at all (ie Brickley 2008). For the purposes of this report, a list of all the relative frequencies of non-metric traits has been provided for comparative purposes. Although it has been suggested (Hauser and De Stefano 1989, 9) that data for non-adult individuals can reasonably be combined with adult males and females, only adult individuals have been considered in this presentation of data. The traits selected according to the criteria above were subject to analysis, firstly with respect to the overall population crude prevalence rates and phase. Those traits that then were of interest in respect to frequency or potential changes through time were then analysed according to ascertain if any sexually dimorphic or temporal trends could be identified. Possible familial connections based on the excavation observations of groups of individuals found buried closely together were also explored.

The results of the analysis identified relatively frequent occurrences of metopism (16%), lambdoid ossicles (35%), asterionic bones (15%), maxillary tori (21%) superior atlas facets (24%), posterior atlas facets (19%), accessory transverse foramen (48%) and tibial squatting facets (28%) amongst the adult population in reaction to other assemblages (see below for comparisons). As the aetiology of many of these traits is unknown there is some question as to the utility of understanding prevalence of these traits, beyond a population specific

'fingerprint'. What is, however, more apparent form the analysis is that the rates are broadly stable through time with little apparent variation between phase A and phase B. This suggests that the traits are likely to be inherent within the population either as a result of genetic or environmental factors which have changed little from the 11th to the 17th century.

Notable exceptions to this trend are significant reductions in the frequency of accessory transverse foramen and tibial squatting facets from phase A to phase B which both show reductions in frequency of over 20% (Table 24). The reasons as to why this decrease is seen with the former trait are not clear but may relate to an enlarged genetic pool in the later period. The latter trait has, however, often been related to activity induced skeletal modification as a result of repeated adoption of a squatting posture (ie Mays 1998). The decrease in observable instances can thus be reasonably inferred to be due to a change in general activity patterns of the population or, most likely, a change in the socio-economic makeup of the population. When examined in relation to biological sex it is further clear that the frequency of the trait amongst females is far higher than it is in males, echoing reported findings at sites such as Wharram Percy (Mays 1998, 119) and suggesting the biomechanical stresses resulting in the presence of the trait were far more common in women than in men. Mays further suggests for Wharram Percy that the engendered female tasks such as child rearing, baking and spinning could reasonably assumed to involve more resting in the squatting position and this may be the case at St Nicholas. By extension of this logic, the significant drop in the number of females showing this trait in phase B may suggest the women from this burial phase were no longer performing these roles as frequently. Given the enhancement of the church status and size post-15th century and the fact that all of the phase B burials are *internal* to the church, it appears fairly clear that the later burgers of Aberdeen enjoyed a less biomechanically stressful lifestyle than their pre 15th century counterparts most probably due to higher socio-economic status.

	F	M
A%	63	30
nA	49	57
%B	23	17
nB	48	48
%Overall A	32	16
%Overall B	11	8

Table 24 Tibial squatting facets by phase and sex

What is equally interesting is that the percentage of females displaying tibial squatting facets drops by around 20% between phase A and B whilst males drop by only 8%. Thus it would appear that enhanced socio-economic status has a disproportionate affect on females than on males. It is tempting to speculate that associated privileges such as the employment of servants thus had a more beneficial influence on female lifestyles in Aberdeen than males.

	Metopism	Coronal ossicle R	Coronal ossicle L	Bregma ossicle	Sagital ossicle	Lambdoid Ossicle	Asterionic Bones R	Asterionic Bones L	Occipito-Mastiod Suture ossicle Right	Occipito-Mastiod Suture ossicle left	Maxillary Torus	Mandibular Torus	Parietal notch bones right	Parietal notch bones left
n	193	160	172	172	174	167	152	134	151	156	183	191	151	156
Present	30	5	1	0	8	59	17	20	3	3	39	15	9	9
Absent	163	165	171	172	166	108	135	154	148	153	144	176	142	147
Cp %	**16**	**3**	**1**	**0**	**5**	**35**	**11**	**15**	**2**	**2**	**21**	**8**	**6**	**6**
NO	3	0	0	0	0	1	1	0	0	0	1	0	0	0
nA	119	97	109	109	113	114	107	92	106	110	120	128	107	110
nB	74	63	63	63	61	53	45	42	45	46	63	63	44	46
PA	16	1	1	0	6	21	10	14	0	2	23	7	7	6
PB	12	4	0	0	2	13	5	5	3	1	13	6	1	3
cpA %	**13**	**1**	**1**	**0**	**5**	**18**	**9**	**15**	**0**	**2**	**19**	**5**	**6**	**5**
cpB %	**16**	**6**	**0**	**0**	**3**	**24**	**11**	**11**	**6**	**2**	**20**	**9**	**2**	**6**

Table 21 Cranial non-metric traits

	Superior Atlas Facets R	Superior Atlas Facets L	Posterior Atlas Facets R	Posterior Atlas Facet L	Accessory Transverse Foramen R	Accessory Transverse Foramen L	Supra scapula Foramen R	Supra scapula Foramen L	Distal Septal Aperture R	Distal Septal Aperture L	Femoral Plaque R	Femoral Plaque L	Vastus Notch R	Vastus Notch L	Tibial Squatting Facets R	Tibial Squatting Facets L
N	160	162	153	151	182	178	121	127	226	211	207	207	216	206	246	240
Present	33	39	27	28	87	86	10	13	10	12	22	23	19	25	70	68
Absent	127	123	126	123	95	92	111	114	216	199	185	184	197	181	176	172
CPR%	**21**	**24**	**18**	**19**	**48**	**48**	**8**	**10**	**4**	**6**	**11**	**11**	**9**	**12**	**28**	**28**
NO	2	2		1	3	2			1	1	1		1	1	9	9
nA	120	122	112	112	127	128	81	84	127	128	117	120	121	116	110	123
nB	40	39	40	37	50	47	39	42	99	82	89	86	95	89	125	108
pA	24	30	17	20	65	66	5	5	5	8	13	11	14	17	42	43
pB	9	8	8	6	15	17	4	7	5	3	8	11	5	7	17	15
CPR%A	**20**	**25**	**15**	**18**	**51**	**52**	**6**	**6**	**4**	**6**	**11**	**9**	**12**	**15**	**38**	**35**
CPR%B	**23**	**21**	**20**	**16**	**30**	**36**	**10**	**17**	**5**	**4**	**9**	**13**	**5**	**8**	**14**	**14**

Table 22 Post-cranial non-metric traits

	Metopism	Lambdoid Ossicle	Asterionic bones	Maxillary Torus	Mandibular Torus	Superior Atlas Facets	Psoterior atlas facets	Acc Transforamen in cVert	Tibial Squatting Facets
CPR%M	8	49	13	18	13	27	22	43	16
nM	101	75	80	94	94	91	85	99	106
CPR%F	22	30	10	28	4	16	18	50	40
nF	83	72	63	75	75	72	67	81	110

Table 23 Sexual dimorphism of selected traits

Chapter 5 Osteo-Arthritis and Spinal Joint Disease

By Paul RJ Duffy

Osteo-arthritis

The most frequently identified disease found in any archaeological population is degenerative joint disease, which together with osteophytosis is often termed degenerative joint disease (Rodgers 2000, 163). The condition affects the synovial joints of the body and is characterised by collagen breakdown at the joint, which results in the degeneration and erosion of articular cartilage and exposure of the bone beneath. Once the cartilage has disintegrated the underlying bone surfaces at the joint will eventually come into contact eventually resulting in the polishing of the bone surfaces (eburnation) which is the pathogonmonic indicator of the disease. Other manifestations of this process are the formation of bony growths or osteophytes around the joint margins, the formation of porous areas, cists beneath and on the joint surface and modification of the shape of the joint surface as a result of such changes. All these osseous responses are, in essence, related to the body' attempt to compensate for the increased and/or altered stress on the joint caused by the cartilaginous breakdown.

The aetiology of the disease is multifactory and not known with any certainty but it is clear that there are a number of contributory factors that are generally agreed to be of significance (Sowers 2001). The precipitating physical factors are most commonly related to age, sex and weight with instances increasing with age and obesity, and the disease is generally seen more prevalent in women than in men. A crucial factor is also repeated stress on the joint related to activity. As Waldron emphatically states, 'joints that do not move do not get OA' (2006, 55). Race and genetic predisposition also appear to be important mitigating factors which influence the development of the disease in some individuals and not others, even when of similar age and sex, and when exposed to the same activity stresses. Secondary osteoarthritis may also develop following a traumatic injury. What is clear is that early attempts to understand such things as occupation through an analysis of the frequency and patternation of osteoarthritis in skeletal populations are now discredited and the recognised complex and mutifactory nature of the disease ensures that any conclusions drawn as the result of such analysis must be treated with caution.

As mentioned above the pathogonmonic diagnostic criteria of osteo-arthritis is eburnation of the bone surface, and this has been used in this report as a single diagnostic observation. Various other criteria are also employed to diagnose the condition by authors of published reports. For the skeletal assemblage from St Nicholas, osteoarthritis has also been diagnosed following the criteria outlined by Roberts and Manchester 1997, where each joint was also assessed for macroporosity, marginal ostephyte formation and significant joint surface modification. The presence of two or more of these criteria was deemed satisfactory for a diagnosis of OA to be made.

	M	F	All	CPR%M	CPR%F	CPR%All
A	44	30	77	39% (n=112)	38% (n=80)	34% (n=231)
B	17	14	38	23% (n=75)	20%(n=70)	18%(n=210)
All phases	64	47	124	33% (n=195)	23%(n=162)	26% (n=468)

Table 25 Adult individuals affected by OA by sex and phase

In total 124 individuals were diagnosed with osteoarthritis at St Nicholas. Of these 64 were male and 47 female, with a further 13 cases where sex and/or phase could not be attributed. The highest number of individuals came from phase A, reflecting the higher number of

individuals from this population, but overall the male to female ratio is fairly even. This is relatively unusual in comparison to accepted modern aetiologies of the disease, where a greater number of females than males would be expected to be affected. It is, however, a trend that is reflected in both the early and later phases of the burial assemblage. Crude prevalence rates drop between both phase A and Phase B with a slightly higher reduction in female individuals. The difference is interestingly mirrored at other medieval sites such as Barton (Waldron 2006).

	Phase A	% of total affected	CPR%	Phase B	% of total affected	CPR%	All	% of total affected	CPR%
YA	14	18	24%(n=58)	4	11	10%(n=39)	20	17	20%(n=102)
MA	42	55	55%(n=77)	17	46	30%(n=57)	61	50	43%(n=141)
OA	7	9	58%(n=12)	5	14	45%(n=11)	12	10	52% (n=23)
A	14	18	17%(n=84)	11	30	11%(n=103)	28	23	14%(n=202)
n	77	100	33% (n=231)	37	100	18%(n=210)	121	100	26%(n=468)

Table 26 OA number of individuals affected by phase and age

Analysis of instances of OA related to age shows more typical profile with the highest percentage CPR for individuals exhibiting OA falling clearly into the older adult age category (Table 26). The percentages of individuals affected in the different age categories show a consistent reduction between the early and later phases of the site, suggesting that an underlying trend towards developing OA is present throughout the population broadly mirroring the findings of the analysis of OA prevalence by sex. One notable exception is the number of young individuals affected – certainly higher that would be seen with a modern population. As has been noted elsewhere (Waldron 2006, 56) this is probably a reflection of the earlier age at which people started strenuous activities. The presence of a child and two adolescents with OA (not in table) is also unusual and will be discussed below.

	Males			Females			Total		
	A	B	All phases	A	B	All phases	A	B	All Phases
SPINE	77	47	69	83	57	77	77	47	67
HAND	23	24	22	27	71	40	23	37	27
FOOT	16	24	19	20	21	23	21	29	24
ACJ	23	35	27	17	14	19	19	21	21
SHOULDER	23	18	22	7	7	9	18	11	16
ELBOW	16	24	17	10	21	13	13	18	15
KNEE	5	18	8	23	21	23	13	16	15
WRIST	9	12	9	20	7	15	13	8	10
SCJ	5	6	6	3	14	9	5	8	7
HIP	7	18	9	3	0	2	5	11	6
ANKLE	2	0	2	7	0	4	1	5	3
OC	5	0	3	0	0	0	3	0	2
TMJ	2	0	2	0	7	2	1	3	2

Table 27 OA percentage of individuals affected by site and phase and sex

As has been noted elsewhere, the synovial joints of the body are not affected by OA in equal proportions. Table 27 shows the rank order of sites affected in the St Nicholas assemblage and it is clear that the spine is by far the most commonly affected area. Some variations can be observed in relative prevalence's between phase A and B, but as has been discussed above, the complex aetiology of osteo-arthritis generally precludes speculation on occupation change based on rates of individual occupations. Most notable is the dramatic decrease in the percentage of individuals affected by spinal osteoarthritis between phase A and phase B. This is discussed further below

	YA	MA	OA
N affected	20	61	12
N in population	97	140	26
% of population affected	21	42	46

Site	YA	MA	OA
SPINE	14	44	8
HAND	3	21	5
FOOT	3	16	3
ACJ	2	17	4
SHOULDER	0	13	3
ELBOW	1	13	2
KNEE	2	9	2
WRIST	1	11	1
SCJ	2	3	2
HIP	0	3	3
ANKLE	1	2	0
OC	0	1	0
TMJ	0	1	0
N affected	20	61	12
N in population	97	140	26
Crude prevalence rate%	21	42	46

Table 28 OA number of aged individuals affected by site and age

Analysis of the distribution of sites affected in relation to age demonstrates a fairly well established trend with the progression of OA and the relationship with age (Table 28). Allowing for the inherent difficulties with the calculation of crude prevalence at a population level, a basis calculation of the number of individuals affected in relation to the overall population in each age group demonstrates a steady increase in the likelihood that an individual will be affected by OA as age increases. The distribution of the individual sites affected demonstrates that that most synovial joints have the potential to be affected at any stage of adulthood, the most notable exception being the absence of OA in the shoulder joints of young adults. The relative low instance of involvement of joints other than the spine in

young adults is also of interest, and may be suggestive of a common underlying causal factor in this expression of the disease in this age group. It is also interesting that the relative proportion of young adults who suffer from osteo-arthritic changes is relatively high in relation to both the population from St Nicholas and to modern populations, supporting the hypothesis presented elsewhere (Roberts and Cox 2003) that individuals were more likely to be involved in biomechanically stressful activities from a younger age in the past.

	YA	MA	OA
SPINE	48	29	24
HAND	10	14	15
FOOT	10	10	9
ACJ	7	11	12
SHOULDER	0	8	9
ELBOW	3	8	6
KNEE	7	6	6
WRIST	3	7	3
SCJ	7	2	6
HIP	0	2	9
ANKLE	3	1	0
OC	0	1	0
TMJ	0	1	0
n	29	154	33

Table 29 Percentage of sites affected by age relative to age category

The effects of age are also demonstrated through analysis of the relative percentages of sites affected for each age group (Table 29). It also demonstrates that the trends to more widespread and more frequent development of OA occur as age increases. Again it is interesting to note that anomaly of spinal involvement in young adults. There also appears to be an increasing tendency to develop OA of the shoulder joint and hip with increasing age

	Number			Percentage of individuals affected		
Number of sites affected	YA	MA	OA	YA	MA	OA
1	12	23	4	60	38	33
2	6	12	2	30	20	17
3	1	7	2	5	12	17
4	1	7	3	5	12	25
5		5		0	8	0
6		2		0	3	0
7		4		0	7	0
8		1	1	0	2	8
n	20	61	12	21	60	15
Mean	2	3	3	2	3	3

Table 30 Percentage of individuals affected by age category by number of sites affected

It is also clear that the number and variety of sites on the body affected by OA increase with age (Table 30). Clearly, the mean number of sites affected increases between young and

middle adulthood. The observation that there does not seem to be a similar increase into old adulthood may be real, but is unreliable due to the limited sample size of this age group. More certainly, middle and old adults have a greater number of individuals who are affected by OA at multiple sites, whilst young adults clearly have involvement predominately limited to a single site on the body. This supports the observation from both ancient and modern studies that prevalence of OA is linked to age.

Spinal Joint Disease

Osteo-arthritis

The diagnostic criteria employed for the identification of spinal joint disease are broadly the same as those utilised for the diagnosis of degenerative joint disease on the other elements of the skeleton. The key feature, unsurprisingly, is that either eburnation or a combination of porosity, osteophytes formation and joint surface modification are observable on the spinal column.

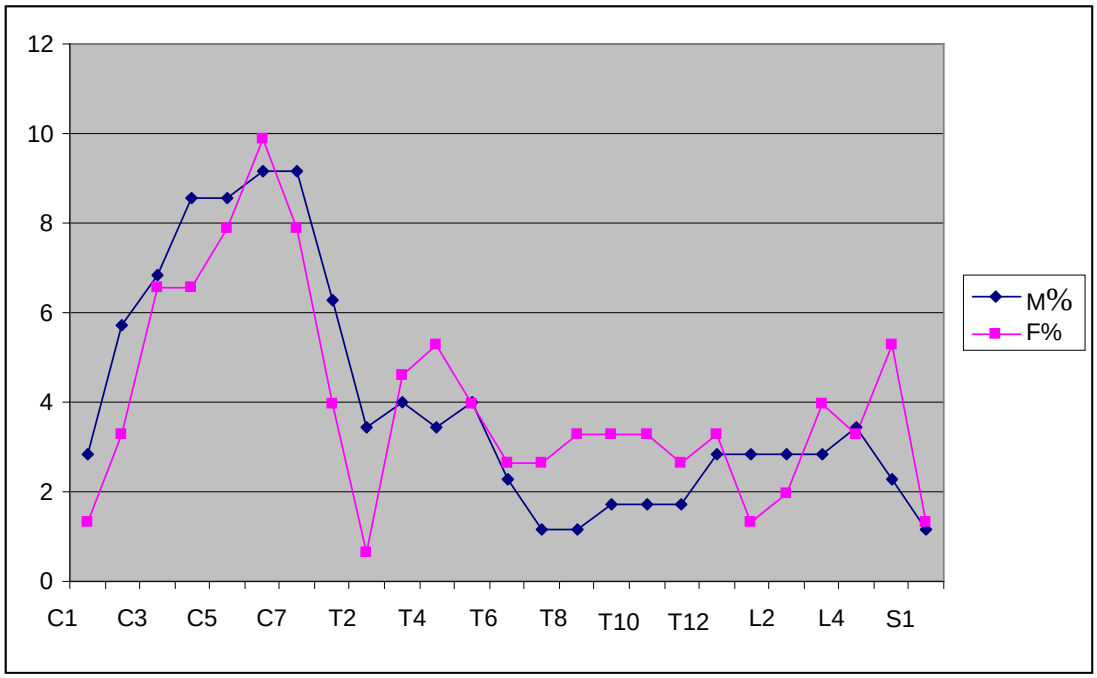

Table 31 Percentage of vertebra affected OA by sex (n=63)

In total 63 individuals who were afflicted by OA of the spine could be sexed (Table 31). It is clear that the cervical spine was the area most frequently affected by spinal OA in both phase A and B for both males and females, with males having a slightly higher percentage of cervical vertebra involvement than females. Females on the other hand show a tendency to develop OA in the lower thoracic spine and in the lower lumbar spine.

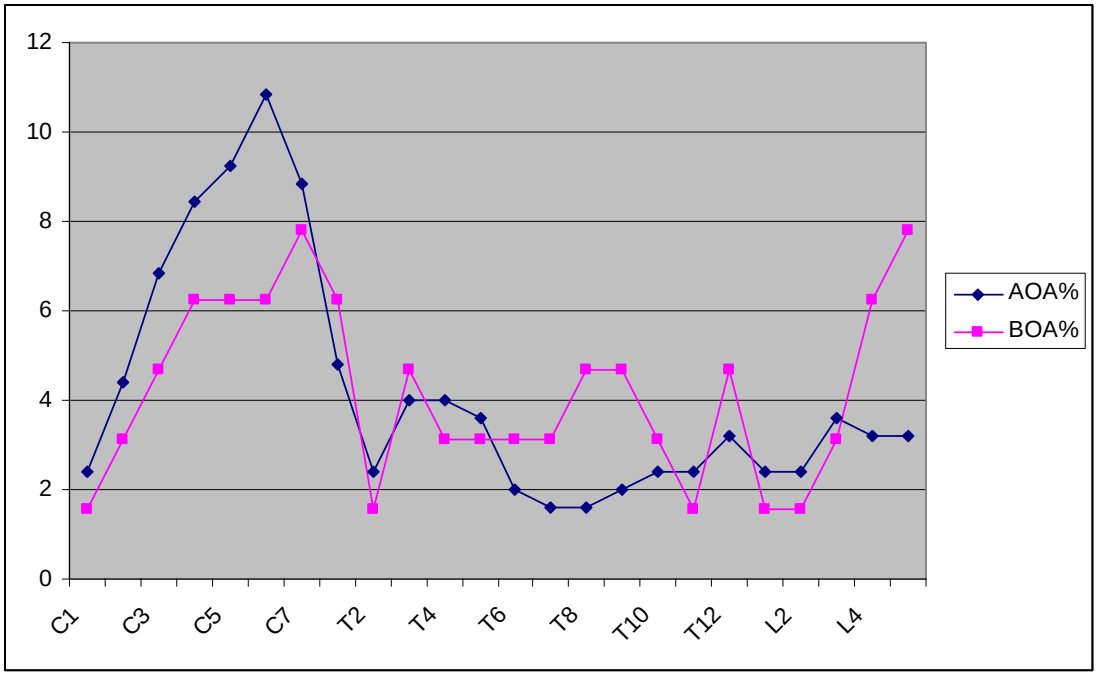

Table 32 Percentage of vertebra affected OA by phase (n=63)

When the frequency of involvement of individual vertebrae are examined in relation to phase, it is noticeable that there is an apparent trend towards reduced involvement of the cervical spine in phase B and a corresponding increase in involvement of the lower thoracic and lower lumbar spine (Table 32). Further analysis of spinal involvement in OA was frustrated by the small sample size (n=63) which prevented any meaningful analysis of relative frequencies of occurrence by phase and sex

Schmorls Nodes

A further category of observable bony changes can be utilised as diagnostic criteria in the diagnosis of spinal joint disease, that of Schmorls nodes. These are considered to be the result of herniation of the contents of the inter-vertebral discs onto the superior and inferior surfaces of the vertebral body, a phenomenon that has been particularly associated with repeated flexion and lateral bending (Kennedy 1989). Although other authors have suggested alternative causes for such lesions it is clear that a broad consensus exists which relates the observed osseous defects to repeated loading of the spinal column. In this case they often occur at multiple sites, or as the result of a traumatic injury, when they usually occur in isolation on a single vertebral body surface.

Phase	Female	Male	All
A	33	52	88
B	9	23	37
All	44	76	135
CPR A%	42% (n=79)	47 % (n=110)	18% (n=478)
CPR B%	13% (n=69)	31% (n=74)	11%(n=341)
CPR All%	30% (n=148)	41%(n=184)	29% (n=468)

Table 33 Percentage of males and females affected by SN by phase

In the St Nicholas assemblage several trends are immediately observable (Table 33). In general males are more affected by Schmorls nodes than females. This difference exists in phase A but becomes markedly more increased in phase B, where males are almost three times as likely to suffer from the condition than females. Overall there is a decrease in the crude prevalence rate of individuals affected between phase A and phase B, a similar pattern to that seen for spinal osteo-arthritis.

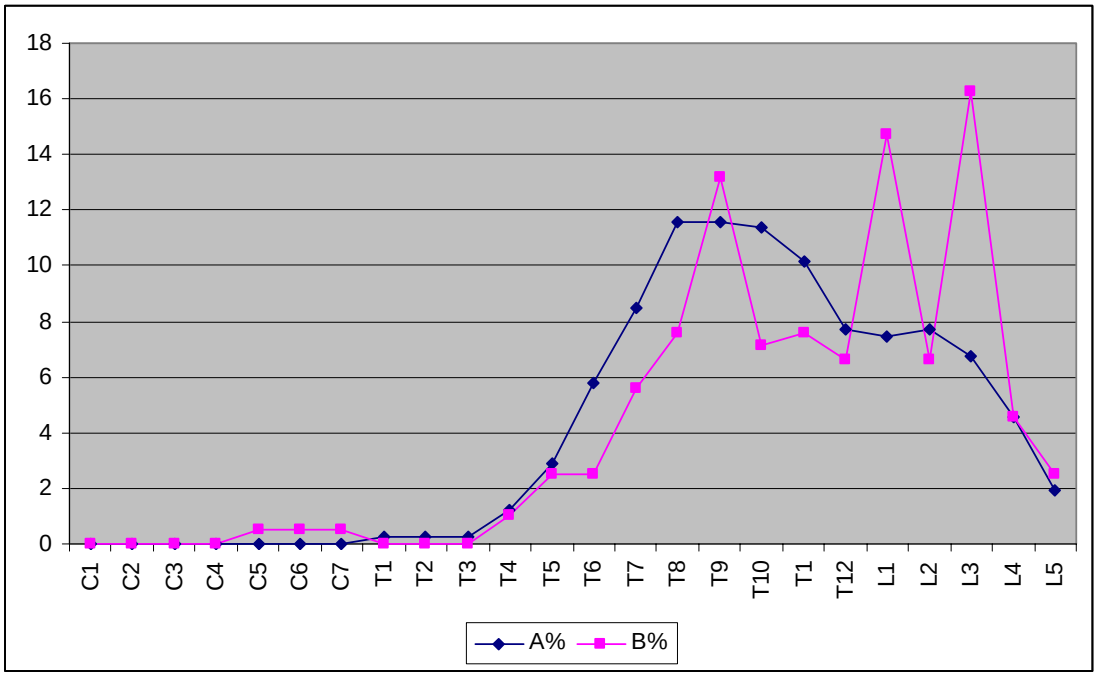

Table 34 Percentage of vertebrae affected by Schmorls nodes by phase (nA=414, nB=197)

When the specific locations of Schmorls nodes on the vertebral column are investigated, it is also clear that changes occur between phase A to phase B (Table 34). Both phases show a characteristic absence of involvement of the cervical spine, a generally observed trend in Schmorls nodes. However, there is clearly a trend towards greater involvement of the lumbar spine and a corresponding reduction in involvement in the thoracic spine in phase B compared to phase A.

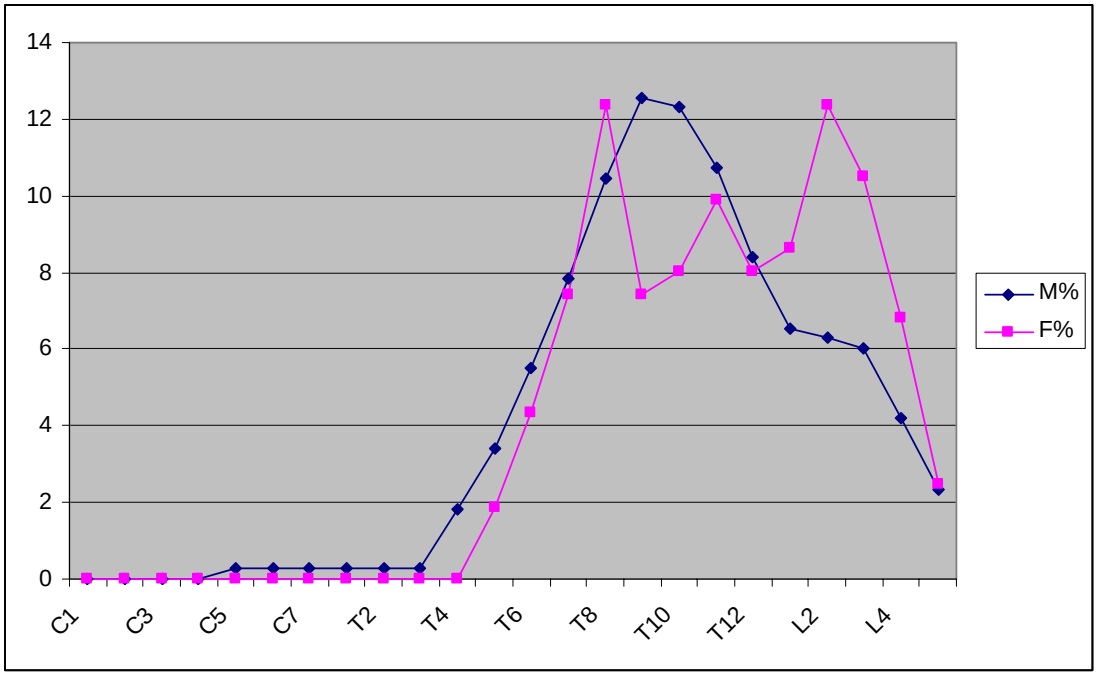

Table 35 Percentage of vertebrae affected by Schmorls nodes by sex (nM=382, nF=162)

It is also apparent that there is a variation in vertebral involvement between males and females with males tending towards greater involvement of the lower thoracic and upper lumbar vertebra and females having greater involvement of the lumbar vertebra (Table 35).

Chapter 6 Other joint disease

By Paul RJ Duffy

Rheumatoid arthritis

Rheumatoid Arthritis is a systemic inflammatory disease of unknown origin, affecting connective tissue and synovial joints (Aufterheide and Rodriguez Martin 1998). It has a world-wide distribution, is seen more commonly in females than in males (Jozsa and Kannus 1997) and has both adults and juvenile forms (Roberts and Manchester 1997; Rothschild *et al.* 1997). The main osseous characteristics of the disease are well documented and most notably consist of erosive changes to the joint surfaces of the hands and feet, shoulder and knee with little proliferate bone response.

Sk	Age	Sex	Phase	Main Phase	Description
251	A	NO	4B	B	Probable RA foot
293	A	NO	4B	B	Probable RA foot
665	A	NO	4B	B	Probable RA foot

Table 36 Individuals with rheumatiod arthritis

Three cases of probable rheumatoid arthritis were identified from the St Nicholas assemblage. All were unsexed adults from phase B (Table 36). Preservation of all of the skeletons was poor with limited skeletal preservation and diagnosis is thus provisional.

The first individual (Sk 251) presented bilateral and symmetrical lytic lesions on both feet which affected the distal joint surfaces of the left metatarsals and the first and second cuneiform of the right foot. The lesions were erosive and no evidence of reactive bone formation was evident. The second individual (Sk 293) also had bilateral and symmetrical lytic lesions of the foot. Both left and right naviculars and the third left tarsometatarsal joint were affected. Again, lesions were erosive with no sign of reactive bone formation. The third, possible case, presented with similar bilateral and symmetrical lytic lesions in the feet, affecting multiple tarsometatarsal and metatarsophalangeal joints. The condition had also resulted in ankylosis of the first metatarsal and first cuneiform, and second metatarsal and second cuneiform and no evidence of reactive bone was noted around any of the lesions. The diagnosis was complicated slightly by the presence of tibial and fibular enthesopathies, which is more consistent with a spondylarthrothrapy related condition. However, on balance a diagnosis of RA fits with the majority of the skeletal evidence.

Seronegative spondylarthropathies

Seronegative Spondlarthropathies are a group of rheumatoid diseases, characterised by the presence of a common immunogenetic marker, the HLA-B27 antigen (Jozsa and Kannus 1997). A number of conditions have been defined as being part of this disease group specifically Ankolysing Spondylitis, Reiters Syndrome (Reactive arthritis), Psoriatic Arthritis and undifferentiated spondylarthropathies. These disorders were originally considered to be related to rheumatoid arthritis, but the presence of a common antigen and the identification of a high frequency of related disorders in family groups (Lui *et al.* 2001) in fact demonstrate that the two are distinct. The various conditions predominantly affect males and Caucasians (Jacobs 1983: Sampio Barros 2001), although isolated populations, such as Inuits, may show a higher propensity for the HLA-B27 antigen, and thus for the diseases of the

spondylarthropathy group (Boyer *et al.* 1999). All generally result in enthesopathy formation at the attachments of tendons to bones.

Ankolysing Spondylitis (AS)

The most severe overall skeletal manifestations in this group of diseases is found in cases of ankolysing spondylitis, a systemic, progressive non-infectious disease which affects mostly males (c. 90%) and whose onset is usually between 15 and 35 (Forestier and Lagier 1971; Aufterheide and Rodriguez Martin 1998). The most obvious osseous expressions of this disease, the fusion of the sacroiliac joint and the calcification of the anterior longitudinal and adjacent spinal ligaments are well documented (Cruickshank 1971; Ball 1979; Burgos Vargos 1989). No cases of AS were identified from the St Nicholas assemblage.

Reiters Syndrome

The diagnosis of Reiters syndrome is dependent on three clinical features: non-specific urethritis, conjunctivitis, and arthritis (Keat *et al.* 1979). The ratio of affected sexes is again strongly skewed to males (90%), and, although reported age ranges vary widely (for example Wallenhaupt *et al.* 1989), age of onset is usually between 15 and 35 years of age (Rodgers and Waldren 1995). Although the specificity of the first two features would appear, at first glance to exclude skeletal diagnosis, the disease is in fact partially defined by reactive changes at entheses of the lower limbs (Aufterheide and Rodriguez-Martin 1998), and displays a preponderance of involvement of knees, ankles and feet. Most notably affected is the calcaneus (Rodgers and Waldren 1995), where morphological changes are predominantly take the form of erosive changes at the posterior and planter aspects of the calcaneal entheses, the femoral trochanter and tibial tuberosity (Resnick *et al.* 1977; Martel *et al.* (1979). Radiographic study by Resnick *et al.* (ibid.) demonstrated that both sites can be affected, with no distinction noted between unilateral and bilateral involvement. No definite cases of Reiters syndrome could be identified in the St Nicholas assemblage.

Psoraic arthritis

Psoriatic arthritis is a systemic inflammatory disease associated with psoriasis (McGonagle *et al.* 1999). The condition shares many common features with other conditions of the spondylarthropathy group. It develops in c 10% of patients with psoriasis and, unusually, more commonly affects woman and men equally (Rodgers and Waldren 1995). Of this number, around 8% have entheseal involvement. The major skeletal involvement of this disease is the erosion of the distophalangeal joints, which, in severe cases, manifests as 'pencil in cup' deformities (McGonagle *et al.* 1999). Tendenous involvement is similar to that of Reiters Syndrome (Martel *et al.* 1979), with entheseal changes most often identified in the lower extremities, specifically the insertion points of the calcaneus and the tibial tuberosity (Taccari *et al.* 1996: Frediani *et al.* 2001). Entheseal involvement of the olcranon process of the ulna (Scarpa *et al.* 1994) and the insertion of biceps brachii on the proximal humerus (Smith *et al.* 1991) have also been reported. The condition of sternocostoclavicular hyperostosis, shares common features with the seronegative spondylarthropathy group (Jahangier *et al.* 1997) and, has been suggested to be a more extreme expression of psoriatic arthritis (Jana and Pavel 1993).

Sk	Age	Sex	Phase	Main Phase	Description
173	MA	F	4B	B	Psoriatic arthritis
529	MA	F	3A	A	Psoriatic arthritis

Table 37 Individuals with psoriatic arthritis

Two possible cases of psoriatic arthritis were identified from the St Nicholas assemblage, one from phase A and one from phase B (Table 37). Both were mature adult females. The first case (Sk 173) presented with bilateral and symmetrical lytic lesions of the tibiae, fibulae and feet which showed evidence of reactive bone formation. Although several diagnosis could be put forward on this basis the presence of concentric remodelling of the right metatarsals, which eventually leads to the classic 'pencil in cup' appearance in psoriatic arthritis, strongly suggested psoriatic arthritis was the most likely diagnosis. The second case (Sk 529) displayed a more classic 'pencil in cup' pattern of joint erosion at the distal phalange of the third phalanx. This, in combination with the presence of erosive lesions and reactive bone formation suggest psoraic arthritis

Undifferentiated Spondylarthropathies

In the absence of clearly recognisable symptoms, such as spinal or distophalangeal involvement, exist there is often little to distinguish similar conditions of this group. These conditions, which share the common characteristics of seronegative spondylarthropathies as defined by the European Spondylarthropathy Group (Boyer *et al.* 1999), fall under the collective description of undifferentiated spondylarthropathies (Sampaio-Barros *et al.* 2001).

Sk	Age	Sex	Phase	Main Phase	Description
3027	OA	M	4B	B	Fused l hand - undifferentiated
7	A	M	4B	B	Undifferentiated
298	MA	M	4B	B	Undifferentiated – possible Reiters Syndrome left foot
8082	MA	F	1-2	A	Undifferentiated
2	A	NO	1-2	A	Undifferentiated – possibly PA but poorly preserved

Table 38 Individuals with undifferentiated spondylarthropathies

A number of individuals were classified under the heading of undifferentiated Spndylarthropathies (Table 38). This is a reflection in part of the difficulties of diagnosis of the specific manifestations of the spondylarthropathy group in skeletal populations where preservation is often variable. All of the individuals in this group clearly showed erosive lesions and proliferative bone response consistent with a diagnosis of a condition related to the seronegative spondylarthropathy group. Due to factors such as poor preservation (ie Sk 30), limited portions of the skeleton available to examine (ie Sk 822) or additional unrelated but masking conditions such as DISH (ie Sk 277) specific diagnosis has not been possible.

Gout

Gout may be described as a 'crystal deposition disease'. It occurs due to a disturbance in purine metabolism which results in the accumulation and deposition of uric acid (sodium urate) in the joint. Certain triggering factors, thought to include excesses of alcohol, heavy protein meals, or trauma, may then initiate an inflammatory reaction in the affected joint. It is asymmetric and most often occurs in the first metatarsophalangeal joint, although the hands, knees, wrists and elbows may be affected. The condition is seldom seen in individuals under the age of 40 and nine times out of ten it affects males rather than females.

There also often appears to be a hereditary factor involved (Ortner & Putschar, 1981). Gout is infrequently reported in archaeological specimens, again possibly due to problems with differential diagnosis and loss of the appropriate elements.

Sk	Age	Sex	Phase	Main Phase
631	MA	M	2-3	A
701B	MA	M	2-3	A
809	MA	M	1-2	A

Table 39 Individuals with gout

Three individuals were diagnosed with gout from the St Nicholas assemblage (Table 39). All were mature adult males and all were from phase A. Sk 631 displayed the characteristic lesion of gout, a scooped lytic lesion which affected the left first metatarsal and first proximal phalange. Similar lesions affected both first metatarsals of Sk 701B with evidence of secondary OA of the distal joint surfaces. The final individual, Sk 809 had a lytic lesion on the first metatarsaophalangeal joint. This did not share the same scooped out appearance as the other observed cases but was judged to be the most likely diagnosis.

Hallux Vulgus

Hallux Vulgus or bunions are a structural deformity of the bone and joint tissue between resulting from an enlargement of bone or tissue around the joint at the head of the first metatarsal. The visible skeletal deformity is the displacement of the big toe towards the other toes. The condition is reported to be much more common in females than in males.

Sk	Age	Sex	Phase	Main Phase
13	A	M	4B	B
46	A	NO	4B	B
385	MA	M	3A	A
614	A	M	2-3	A
619	A	NO	2-3	A
883	A	NO	2-4	-

Table 40 Individuals with bunions

At St Nicholas a total of six cases of bunions were identified (Table 40). These were fairly evenly distributed between phase A and B but, perhaps surprisingly, all of the individuals who could be sexed were identified as male. Three of the six individuals were however, unsexable and thus the general pattern of prevalence of this condition may be distorted by the limitations of analysis. In only one case, Sk 385, could an age be assigned for the skeletons, the rest being only attributable as adult.

Diffuse Idiopathic Skeletal Hyperostosis (DISH)

Although similar in appearance to the seronegative arthropathy ankolysing spondylitis, DISH is of an entirely different, although as yet not fully understood, aetiology. Factors related to its development appear to be obesity, diabetes and certain ethnic assemblages. It affects males rather than females and occurs only in mature-adults (aged 45 - 50 years). The disease is characterised by ossification of the anterior longitudinal ligaments of the spine and profuse new bone formation. The individual may be asymptomatic, or suffer from stiffness, dysphagia (difficulty in swallowing), or joint pain, depending on how far the disease has

progressed. In the archaeological record DISH is seen with a higher than normal frequency in British monastic sites.

In total five cases of DISH were diagnosed from the St Nicholas assemblage. A further seven individuals were identified with typical skeletal manifestations of DISH in the form of 'candle wax' ossification of the anterior longitudinal ligament in sacroiliac fusion in combination with profuse enthesopathy formation (Table 41). This latter group could only be identified as probable cases though as skeletal changes were not sufficiently advanced to allow a definitive diagnosis.

Sk	Age	Sex	Phase	Main Phase	Notes
30	OA	M	4B	B	DISH
110	MA	M	4B	B	DISH
206	A	M	4B	B	DISH
277	A	M	4B	B	DISH
701B	MA	M	2-3	A	DISH
412?	MA	M	3A	A	Probable early DISH
101	MA	M	4B	B	Probable early DISH
228	YA	M	4B	B	Probable early DISH
317	MA	F	1-3	A	Probable early DISH
375	MA	M	4B	B	Probable early DISH
496	MA	M	3A	A	Probable early DISH
605	MA	M	1-3	A	Probable early DISH
804	A	M	2-3	A	Probable early DISH

Table 41 Individuals with DISH

The vast majority of cases (75%) involved males over 40 years old at death, reflecting the traditional group affected by this disease. In only one case (Sk 317) was a female identified with probable early DISH related changes. One adult male in the young adult age category was also identified with probable early DISH. The occurrences were split equally between phase A and phase B

In total the overall CPR for the disease including the probable cases was 2.56%. For males the CPR was 5.64% and for females 0.61%. For phase A the CPR was 2.59% and for phase B it was 2.86%. Given the small sample size there was little merit in further analysing data relating to the change of the disease in relation to age, sex and phase.

Chapter 7 Infectious diseases

By Paul RJ Duffy

Infections may be, caused by known or unspecified pathogens and are thus defined in paleopathology studies as specific or non-specific. Whichever the case only two responses may be invoked-bone growth, or bone destruction. The type of new bone growth present can provide an indication of the duration of the infection and whether it was still active at the time of death, or in the process of healing. Quite often the only way of determining which specific disease was responsible for the infectious change is by examining the distribution of the lesions throughout the skeleton. This becomes difficult and often impossible where remains are incomplete or eroded. Periosteal new bone growth can also occur in response to sub-periosteal haemorrhaging, for example in scurvy, and often only the distribution of the lesions can enable a differential diagnosis to be made.

Bone Infection

Bone infections can sometimes be identified to a specific cause by a known organism such as TB or leprosy, but more frequently in archaeological samples bone infections result from no specific identifiable disease process. Three main responses can be indentified in bone, periostitis (infection of the periosteum), osteitis (infection of the compact bone) and osteomyelitis (infection of the medullary cavity with associated pus formation and bone repair). Various debates exist as to the utility of such separations, as bone is a single biological unit, but it is suggested that such both systems of description have their uses (Roberts and Manchester 1997, 126)

Osteomyelitis

Osteomyelitis is an infection of the bone and bone marrow which results in inflammatory disease of the bone, identified through enlargement and deformation of the bone and the presence of cloacae, resulting from the presence of pus filed cavities during life.

Sk	Age	Sex	Phase	Main Phase	Description
258	MA	F	4B	B	Osteomyelitis left calcaneus
273	A	M	4B	B	Osteomyelitis right femur
573	MA	M	2-3	A	Osteomyelitis right femur
771	C		2-3	A	Osteomyelitis left tibia

Table 42 Individuals with osteomyelitis

In total four cases of osteomyletis were identified from the St Nicholas assemblage, affecting a 8 to 14 year old child and mature adult male from phase A and an adult male and mature adult female from phase B (Table 42). All these individuals were affected on the lower limbs, two on the right femur, one on the left tibia and one on the left calcaneus. Sk 273 also showed evidence of infection spreading to adjacent skeletal elements with active periostitis being observed on the right tibia and both fibula, with secondary degenerative joint disease resulting from the effects of the infection. Sk 771 also showed evidence of infection spread, with active periostitis observed on the left fibula, as did Sk 258 where active periostitis was observed on the left distal tibia. The boners of the lower limb are generally the most commonly affected in cases of osteomyletis.

Osteitis

Osteitis causes similar osseous changes to osteomyletis but lacks the presence of cloacae. As such, its distinction from osteomyelitis has been questioned, but for clarity it is presented separately here.

Sk	Age	Sex	Phase	Main Phase	Description
155	A	NO	4B	B	Osteitis left tibia
275	C		4B	B	Osteitis right tibia
605	MA	M	1-3	A	Bilateral osteitis temporal

Table 43 Individuals with oseteitis

Three cases of osteitis were observed in the St Nicholas assemblage, a mature adult male from phase A and an adult and a child from phase B (Table 43). the latter two cases both had lower limb involvement. The reactive bone formation and swelling observed may have been related to osteomyelitis but in the absence of an X-ray and with no observable cloacae the conditions could be diagnosed only as osteitis. Sk 155 showed a more unusual infection of the temporal, focussed around the external auditory meatus and more severe on the right side. It is probable that this results from an infection of the outer ear canal.

Periostitis

Periostitis, infection of the periosteum and soft tissues surrounding the bone, is frequently observed in archaeological populations, where it may occur as an expression of a specific disease such as TB or leprosy, as a result of non-specific infection, or direct infection from soft tissue injury. Waldron (2007) successfully argues that the causes of periosteal new bone are frequently misunderstood in discussions about the importance of the presence of the lesions on bone. It is important to realise that the only possible response of the periosteum to stimulation be it inflammation, trauma, burns, bleeding, tumour or infection is to lay down bone. Thus a host of various causes elicit the same osseous response.

Periosteal New Bone on the Ribs

Several conditions can result in periosteal new bone formation on the inners surface of the ribs including TB. As Waldron (2007, 79) points out though, almost any disease of the pleura, can potentially lead to such lesions and differentiation between lesions caused by Tb, pleurisy, pneumonia and a wide range of other conditions.

Sk	Age	Sex	Phase	Main Phase
260	I		4B	B
360	MA	F	2-4	
380	C		4B	B
396	MA	F	4B	B
438	YA	F	3A	A
550	A	M	3A	A
595	MA	M	3A	A
724	C		2-3	A
748	MA	M	4B	B
787	MA	F	2-3	A
789	MA	M	2-3	A
825	**A**	**M**	**2**	**A**

Table 44 Individuals with rib periostitis

In total 12 individual from the St Nicholas assemblage were identified with periosteal new bone formation on the inner surfaces of the ribs, five males, four females, three non adults and one adult of indeterminate sex (Table 44). Six individuals were from phase A and five from phase B with one individual from general phase 2-4. No specific correlation was found with any other condition, either periosteal new bone on other parts of the skeleton or other conditions such as cribra orbitalia or enamel hypoplasia.

Diffuse Periostitis

Two individuals were identified with diffuse periostitis across the skeleton. The first (Sk 240) was a young adult male from phase B who had bilateral periosteal new bone affecting the scapulae, humerii, radii, ulnae, hands, femorae, tibiae, fibulae, feet, and chronic periosteal new bone on the visceral aspects of the ribs. The condition primarily affected the distal thirds of the upper limbs and all of the lower limbs. The second individual (Sk243) was also affected bilaterally on the distal humerii, distal radii, proximal ulnae, hands, distal left tibia, distal right fibula, and visceral aspect of left ribs 2 to 7. In both cases it is clear that some form of generalised systemic disease was active at the time of death but the specific cause is unknown. Similar skeletal pathology observed on individuals from Horse Cross, Perth was suggested to be a response to toxins related to industrial activity (Roberts 2005)

Periostitis on other sites

In total 74 individuals were identified with periosteal new bone at sites other than the ribs: 31 males, 17 females, 20 non adults and 13 adults of unknown sex.

	M	F	Non Adult	All	CPR%M	CPR%F	CPR% Non Adult	CPR% All
A	16	8	6	33	14% (n=112)	10% (n=80)	2.4% (n=249)	7% (n=482)
B	13	8	7	37	17% (n=75)	11%(n=70)	5%(n=133)	11%(n=346)
All phases	31	17	20	74	16% (n=195)	10%(n=162)	4.7% (n=425)	8% (n=891)

Table 45 Periostitis by sex and phase

Analysis of the relative prevalences related to sex, phase and crude ageing (adult/non adult) indicate a relatively consistent rate of periosteal new bone across both phase and sex (Table 45). Slight trends towards increased prevalence in phase B are of some interest, particularly in light of findings from other categories of pathology such as osteoarthritis, which show significant decreases in prevalence rates between phase A and phase B. Overall however, it would appear that rates are relatively stable and are broadly comparable from other reported British examples from the later medieval period (Robert and Cox 2003, 235)

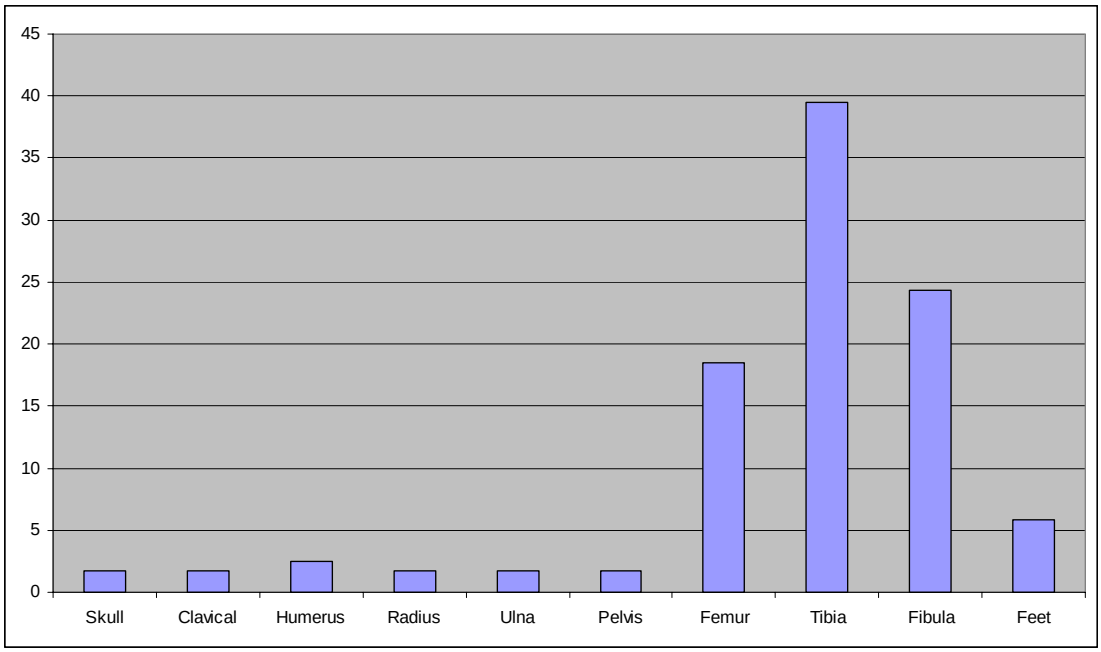

Table 46 Relative percentage of individual sites showing periosteal new bone (pnb) as a percentage of overall affected sites (n=119)

The majority of observed periosteal new bone occurred at three sites, the femur, the tibia and the fibula (Table 46). The tibia was by far the most affected site: 63.51% of affected individuals had tibial involvement representing 59% of affected bones. Fibula periosteal new bone was identified in 37.84% of affected individuals representing 26% of affected bones whilst femoral periosteal new bone was identified in 29.73% of individuals representing 19.6% of affected bones. Over 90 % of individuals affected by periosteal new bone formation thus had involvement in at least one of these three sites. This mirrors common findings related to periosteal new bone distribution from sites such as Barton (Waldron 2007, 80)

Sclerosing Osteomyletis of Garrè

Sclerosing osteomyletis of Garrè is still not completely understood in modern medicine. In spite of the fact that it is caused by bacterial infection, in most cases no bacterial growth can be discovered in culture. Furthermore, it remains open whether the chronic process is maintained by low-grade persistent infection or is maintained by itself after sterilization of the infection. The skeletal manifestation of the disease is a sclerotic and fusiform thickening of the cortex of the affected bone (Aufterheide and Rodriguez-Martin 1998, 178)

One possible cases of this rare condition were identified at St Nicholas. The individual (Sk 695) affected the left humerus of an adult male from Phase A. The condition had affected the proximal third of the humeral diaphysis bone which showed extreme osteoblastic activity which had resulted in thickening of the cortical bone and a dramatic reduction in the medullary cavity space. The changes were highly localised and showed no sign of cloacae.

Tuberculosis (TB)

Tuberculosis is a chronic infectious disease spread by airborne droplet infection. It is caused by the pathogen *mycobacterium tuberculosis*. The bacterium is usually, with a primary focus, formed in the lungs (Ortner and Putschar, 1981: 141). If this fails to heal, then the infection can be spread via the blood stream to other parts of the body, including the skeleton. Those

areas most commonly affected are the bones of the spine, the hands and feet, the ribs, and the knee, hip and elbow joints. Less commonly affected are the bones of the cranium, although this occurs more frequently in young children. Skeletally, the condition is manifest through erosive osteomyletis with little proliferative bone response and generally involving one joint only. Involvement of the spine is present in 20-50% of cases which produces a condition more commonly known as Potts disease (Roberts and Manchester 1997, 138).

Sk	Age	Sex	Phase	Main Phase	Description
337	MA	F	4B	B	Spinal TB
792	A	F	2-3	A	Spinal TB

Table 47 Individuals with TB

Two individuals were identified with definitive skeletal changes resulting from TB (Table 47). Both were female with one from each phase of the site, and both showed typical spinal degeneration as a result of the disease. The first (Sk 337) had scalloped lytic lesions on the lumbar spine (l2 to L5) with little marginal reactive bone formation around the entire lesion. Although the vertebrae were fragmentary, it was apparent that there had been a collapse of the vertebral bodies of L2 and L3 resulting in wedge shaped compression fractures and fusion of the vertebral bodies. On balance a diagnosis of spinal TB was suggested, and osteopenia of the long bones was considered to be associated.

The second individual (Sk 792) had scalloped lytic lesions at the anterior aspect of T7 to T10 which increased in severity and distribution towards the pelvis. Some remodelling was evident and some lesions clearly showed rounded sclerotic margins. The lytic lesions had resulted in the total collapse of the vertebral body of T11 resulting in kyphosis visible on T7 to T10. Woven bone as also observed on the visceral aspect of heads of the right 9 to12 ribs and the left 9 to 11 ribs.

Sinusitis

Maxillary sinusitis may be caused and exacerbated by a number of factors including dust, pollution, dental infections and allergies (Roberts and Manchester 1997). In a live person the soft tissue in the maxillary sinuses becomes inflamed causing pain, discomfort and stuffiness. The condition causes significant morbidity in contemporary affected populations (Anand 2004 in Waldron 2007).

In the skeleton these changes are evident as new bone formation within the sinuses. Diagnosis is thus dependant on the ability to view the floor of the sinus, which is only possible if the sinus is broken or if the sinus is explored with an endoscope. For the St Nicholas assemblage the latter option was not available and so diagnosis rested on non-aided visual observation only. At the end of the analysis phase it became clear, however, that recording of observable and non-observable sinuses had been patchy and was deemed unreliable. The crude prevalence rates below (Table 48) are thus calculated on the maximum potential observations from all skulls in each category. In reality, fewer sinuses would have been available for observation than this and so the prevalence should be regarded as a minimum.

Phase	Female	Male	Adult	Non Adult	All
A	18	24		26	68
B	5	3	2	4	14
All	27	27	2	31	87

CPR A%	40% (n=45)	41.38% (n=58)	-	22.41% (n=116)	31.05% (n=219)
CPR B%	20.83% (n=24)	9.38% (n=32)	-	9.09% (n=44)	13.86% (n=101)
CPR All%	31.03% (n=87)	24.55% (n=110)	-	17.71 (n=175)	25.07% (n=347)

Table 48 Maxillary sinusitis at St Nicolas

What is most immediately striking in the rates of sinusitis is the dramatic drop in prevalence between phase A and phase B in all categories of analysis. Even allowing for some variation of observation potential between the two phases it is clear that the later burial population at St Nicholas church were far less likely to develop infection of the sinuses than the pre 15th century population. It is also of interest that the prevalence rate appears to drop less in females than in males in phase B. Overall, sample sizes are small, which may have elicit some skewing of the data but it is apparent that a trend towards more infrequent sinusitis over time is present in the population.

Syphilis

Syphilis is an infectious disease attributed to the bacterium *Treponema pallidum* and forms part of a family of infectious diseases commonly known as Treponematis. The route of transmission of syphilis is almost always through sexual contact, although a second route of transmission from mother to child in utero is also well documented.

The manifestation of syphilis occurs in three main stages. Primary syphilis is typically acquired via direct sexual contact with the infectious lesions of a person with syphilis and corresponds with an ulcerative (usually) genital infection which appears approximately 10–90 days after the initial exposure (average 21 days). Secondary syphilis occurs approximately 1–6 months after the primary infection and appears as a generalised rash. A patient with syphilis is most contagious when he or she has secondary syphilis. Following the subsidence of these symptoms the disease can lie latent in the body for decades before several manifestations can occur in the tertiary phase of the disease. This stage is characterized by the formation of soft, tumour-like balls of inflammation known as gummas, which appear as a result of an inability of the immune system to completely clear the organism. They may appear almost anywhere in the body including in the skeleton. The gummas produce a chronic inflammatory state in the body with mass-effects upon the local skeletal anatomy.

One case of syphilis was identified from the St Nicholas assemblage. The individual, a 17-25 year old possible male, presented with the characteristic lesions of tertiary syphilis. In addition to the pathagnomic lesions known as Caries Sicca the individual presented with the diffuse cortical thickening and new bone formation of syphilitic periostitis on the distal metaphysis of the tibiae and fibulae, distal metaphysis of the right ulna, distal metaphysic of the right humerus. This suggests that the condition was at an advanced stage. Given the age of the individual this may represent a case of acquired or venereal syphilis (Aufterheide and Rodriguez Martin 1998).

Chapter 8 Trauma

By Paul RJ Duffy

Trauma is a description which encompasses a range of conditions found on human bone and encompasses fractures, dislocation or displacement of joints, disruption of nerve or blood supply, soft tissue injury, and artificially induced deformity. The main categories of traumatic injury identified in the St Nicholas assemblage are described below. Categorisation and diagnosis followed Aufterheide and Rodriguex Martin 1998 and Roberts and Manchester 1997.

Fractures

Fractures are defined as a break in the continuity of bone, cartilage or both and generally also involve a soft tissue injury of some description, although the effects of this are often less visible on the bone than the fracture itself. Fractures are categorized in several ways, each describing a different aspect of the appearance of the fracture. They may be closed, where the skin remains intact, or open (compound) where the skin is broken exposing bone and soft tissue to contamination and a higher risk of infection. Simple fractures are fractures that only occur along one line, splitting the bone into two pieces, while multi-fragmentary fractures (formerly called comminuted) involve the bone splitting into multiple pieces. A simple, closed fracture is much easier to treat and has a much better prognosis than an open, comminuted fracture. Fractures can be further defined as complete or incomplete, linear or transverse, oblique, spiral or compacted, all of which are defined by the appearance of the fracture.

In general, fractures are the most common form of trauma found in assemblages. Their diagnosis can generally be made from the presence of the callous which surrounds the healing bone and allows something to be said as to how recent the fracture was. How the fracture has healed also allows some inferences to be made as to the medical treatment available for the injured person as proper healing often depends on the fracture being properly re-aligned and immobilised for a period of time to allow the bone to knit. Diagnosis of fractures for the St Nicholas assemblage followed Waldron (2007) where rib and spinal fractures have been counted only once, regardless of the number involved

		A	B	All
Number of individuals	M	28	9	38
	F	16	7	27
	All	48	23	77
Number in population	M	112	75	195
	F	80	70	162
	All	478	341	897
Crude prevalence rate %	M	25.00%	12.00%	19.49%
	F	20.00%	10.00%	16.67%
	All	10.04%	6.74%	8.58%

Table 49 Crude prevalence rates by phase and sex

A total of 78 individuals had sustained 97 fractures between them. Of these 38 were male and 28 female, with a further 6 adults of indeterminate sex (Table 49). Crude prevalence rates between males and females showed a bias towards males, both overall and for each phase. Prevalence of fractures decreased between phase A and phase B both overall, and for both sexes. Three children and one infant had also sustained fractures. Fractures were generally

limited to a single site across the body with only 17% of individuals presenting with fractures at more than one site. Only two individuals: an older adult male (Sk861) and an older adult female (Sk758), presented with multiple fractures on the skeleton. The male individual was over 60 and suffered from osteoporosis, undoubtedly making him more vulnerable to fractures. He presented with well-healed fractures of the right clavicle midshaft and a well-healed displaced fracture surgical neck of the right humerus. The man also suffered multiple vertebral fractures from the 5th thoracic to the 5th lumbar vertebrae resulting in kyphosis (outward curving of the spine) and scoliosis (lateral curving of the spine). A single right rib fracture remained unhealed at death. The female individual was over 50 and also suffered from osteoporosis. She had also suffered multiple compression fractures on the vertebral column from 9th thoracic to the 12th thoracic vertebrae. A healed Colles fracture of the right radius and healed fracture on the right 3rd proximal phalange may be related to the same incident, most probably a fall.

		A	B	All
Number of Fractures	YA	8	2	12
	MA	25	13	34
	OA	6	2	8
	A	6	7	13
	Non A	2	1	4
Number in Population	YA	58	39	102
	MA	77	57	141
	OA	12	11	23
	A	84	103	202
	Non A	250	133	425
CPR%	YA	13.79	5.13	11.76
	MA	32.47	22.81	24.11
	OA	50.00	18.18	34.78
	A	7.14	6.80	6.44
	Non A	0.80	0.75	0.94

Table 50 Crude prevalence rates by age

Although fractures are clearly most numerically prevalent in middle adults in the assemblage, it is clear from the crude prevalence rates in Table 50 that fractures are in fact, generally most common in older individuals. The exception to this is phase B, but as it is a very small sample size for older adults, it perhaps skews the data in this part of the analysis. This is perhaps to be expected, as a combination of age related conditions such as osteoporiosis combined with a longer period of life over which to accumulate a skeletal history of fractures, makes higher prevalence rates in older adults more likely. Although the sample size is small, it would further appear that there is a consistent reduction in the crude prevalence rates of fractures across all age ranges from phase A to Phase B, as was found in relation to biological sex.

	M	F	NO	Juv	Total	%of total	CPR
Clavicle	2	1	0	0	3	3	0.33
Humerus	2	0	0	0	2	2	0.22
Spine	12	4	0	1	17	18	1.90
Rib	16	10	3	3	32	34	3.57
Fibula	2	0	1	0	3	3	0.33
Hand	3	4	0	0	7	8	0.78
Foot	1	2	2	0	5	5	0.56
Femur	1	1	0	0	2	2	0.22
Radius	4	5	0	0	9	10	1.00
Sternum	1	0	0	0	1	1	0.11
Ulna	0	6	0	0	6	6	0.67
Skull	3	3	0	0	6	6	0.67
Tibia	0	1	2	0	3	3	0.33
pelvis	0	1	0	0	1	1	0.11
Total	47	38	8	4	97	104	10.81

Table 51 Number of fractures per site for whole assemblage

In general, the crude prevalence rates for fractures are broadly comparable to the average for later medieval examples from across Britain, and present a not untypical profile for a general population (Roberts and Cox 2003 238-9). Interestingly prevalence rates for the whole population are in most cases slightly lower than the reported UK average from the late medieval period with the exception of the spinal fractures, which is higher.

By far the most common site for fractures at St Nicholas was the ribs (Table 51). The majority of individuals had only single instances of rib fractures, with only 4 individuals displaying multiple rib fractures. The crude prevalence rate for rib fractures falls between phase A and phase B (4.18% to 2.64%) but the percentage of rib fractures as overall fractures increases slightly (from 32% to 36%). In effect, people suffered fewer rib fractures in general, in common with all other fractures. However, those that do suffer fractures suffer rib fractures more commonly in phase B than A. Rib fractures are commonly the result of either interpersonal violence or accidental falls and it is reasonable to suppose that at least some of those from the assemblage were as a result of non-accidental injury. Quantification of this is, however, more difficult.

The second most common fracture site was the spine. This number excludes spondylosis, which is discussed later, and the individuals observed had thus primarily suffered compression fractures of the vertebrae. Compression fractures are generally held to be caused by either extended hyperflexion of the spine as a result of sudden movement or by a massive vertical compressive force. In light of the findings relating to spinal osteoarthritis and spinal joint disease outlined in Chapter 5 the high percentage of compression fractures, and significant weighting towards males of spinal fractures in the assemblage (approximately 3:1 in all periods) are of note. The crude prevalence rate for spinal fractures also drops between phases A and B (2.51% to 1.47%) although the proportion of people suffering spinal fractures remains fairly constant as a percentage of all observed fractures (c 20%). This suggests that whatever is driving the reduction in crude prevalence rates of spinal fractures is more related to the reductions in the general propensity of the population to suffer fractures rather than a change in the specific circumstances that cause compression fractures. This is in contrast to

observations such as those from Chapter 5 where there would appear to be change in causal factors in relation to observed decreases in rates of osteoarthritis.

All of the non-adults had sustained fractures of the ribs with the exception of one (SK906), who had suffered a compression fracture of L5 and possibly L2-4, most probably as the result of a jarring fall. This individual was between 5 and 8 years old at death and also suffered from rickets which may have increased the propensity for the bone to fracture; such a condition is unusual in a child.

Spondylolysis

Spondylolysis is a particular sort of fracture which results in the separation of the vertebral arch from the vertebral body at the pars interarticularis of the vertebral arch. The condition has been associated with stress fractures and appears to have higher modern incidence in the young athletic population. It has also been suggested that the condition may be exacerbated through a genetic predisposition (Standaert and Herring, 2000). The modern incidence of spondylolysis in the population has been reported to be about 3–6%. The condition is highlighted here as there is a potential familial link and also a possible link to vigorous activity.

		A	B	All
N=	M	6	0	6
	F	6	1	10
	All	12	1	16
Crude Prevalence Rate%	M	5.36%	0%	3.08%
	F	7.50%	1.43%	6.17%
	All	5.19%	0.48%	3.42%

Table 52 Crude prevalence rates of spondylolysis by sex and period (adult)

Sixteen skeletons from the St Nicholas assemblage were found with spondylolysis, 10 females and 6 males (Table 52). The overall crude prevalence rate corresponds well with the reported modern prevalence described above. The prevalence was much higher in females than in males overall, and this pattern was reflected in each phase. Again it is interesting to note that the crude prevalence rate declines significantly between phase A and phase B

Head Wounds

Three individuals, two females and one male, had suffered depressed fractures of the skull resulting from blunt force trauma (Table 53). All three injuries showed signs of successful healing at death indicating that the injuries were probably non life threatening. Although the identification of such wounds as deliberate or accidental there appear to be no other indications of violent injury on the individual's skeletons. The location of the injuries, particularly those on Sk337 and Sk512 are also consistent with injuries sustained by falls and it may be that all the wounds resulted from non-violent trauma as the result of accidents.

Sk	Age	Sex	Phase	Main Phase	Site
337	MA	F	4B	B	Healed depressed fracture on posterior right parietal adjacent to lambda
385	MA	M	3A	A	Healed depressed fracture on right frontal immediately superior to brow ridge
512	MA	F	2-3	A	Healed depressed fracture on left parietal adjacent to saggital suture and slightly posterior of midpoint

Table 53 Individuals affected by depressed fractures to the skull

A further 4 individuals showed evidence of sharp force trauma to the skull (Table 54). Three were adult males buried in the post 15th century phase of the church. The most severe example was wounds inflicted on a young adult male from phase B (Sk176). Much of the upper skeleton and all of the lower skeleton was absent, but it is clear that he had a sustained and violent attack which had resulted in seven separate traumatic injuries to the skull and one to the sternum. One large wound had resulted from a blow delivered to the left side of the maxilla which had removed the maxilla and alveolar process at the level of the right first incisor round to the left first molar. A nick at the level of the anterior aspect of the base of the left mandibular ramus was probably part of the same wound. A second shallow wound was a located in the middle of the forehead and had penetrated the outer table only. Four further injuries were located at the top and back of the skull, and centred on the left parietal. These had all penetrated the outer and inner table and resulted in spalling of bone from the wound sites. All were unhealed and are most likely peri-mortem injuries.

Sk	Age	Sex	Phase	Main Phase	Sk Pathology Notes
17	C		2-3	A	Possible healed sharp force trauma on frontal?
102	MA	M	4B	B	Sharp force trauma skull
176	YA	M	4B	B	Sharp force trauma skull
202	YA	M	4B	B	Sharp force trauma skullL

Table 54 Individual with cranial sharp force trauma

A second young adult male (Sk202B) had suffered three separate blows reconstructed from a highly fragmented skull: a shallow wound to the superior aspect of the right frontal which had removed a portion of the outer table of the skull: a blow to the left parietal/occipital towards the lambda measuring 23.6 mm in length which had penetrated both the outer and the inner table; and a blow to the right inferior/lateral aspect of the occipital measuring at least 22 mm which had penetrated the outer table and diploe. All were unhealed and are most likely peri-mortem injuries.

A third middle adult (Sk102) from phase B had suffered two blows to the skull. The first, a linear wound measuring c 80mm, cut through the left frontal and left maxilla and had cut the left first incisor. Radiating fractures from this injury extended over the whole frontal and several fragments of bone had spalled from the central frontal as a result. The second was located on the posterior aspect of the right and left parietal, perpendicular to the saggital suture. Both wounds are unhealed and are most likely peri-mortem injuries.

One child c 10-12 years old at death was also identified with possible sharp force trauma to the frontal. Post-mortem damage to the area of injury, however, unfortunately prevented definitive diagnosis.

Post Cranial Wounds

Post cranial sharp force trauma was identified on four individuals (Table 55). The cranial injuries inflicted on Sk176 are described above and in addition the young adult male had also suffered a small cut to the left manubrium, just inferior of the sternoclavicular joint. A further instance of severe trauma was identified on a second young male from phase B who had suffered a catastrophic injury to the anterior-lateral aspect of the distal third of the left femur. The blow had penetrated through to the medulliary cavity and had resulted in a large flake of

bone spalling off, as well a comminuted fracture of the distal third of the femur. It is likely to have resulted in severe blood loss and shock.

Sk No	Age	Sex	Phase	Main Phase	Site
69	YA	M	4B	B	Left femur
176	YA	M	4B	B	Sternum
289	YA	M	2	A	Right coracoid process
881	OA	F	2-3	A	R hand 3rd phalange

Table 55 Individual with post-cranial sharp force trauma

A young adult male from phase A (Sk 289) had suffered a small unhealed cut to the coracoid process of the right scapula. A possible amputation, either accidental or deliberate was also identified on the distal phlange of the third phalanx of the right hand of an older adult female (Sk881)

Dislocations

Joint dislocation (luxation) occurs when bones in a joint become displaced or misaligned. It is often caused by a sudden impact to the joint. The ligaments always become damaged as a result of a dislocation. A subluxation is a partial dislocation.

Sk No	Sk Age	Sk Sex	Sk Phase	Main Phase	Site
272	A	NO	4B	B	Bilateral hip dislocation
611	AD		2-3	A	Hip dislocation
766	MA	F	2-3	A	Dislocated R mandible

Table 56 Individuals with dislocations

Three instances of dislocation were noted in the St Nicolas assemblage (Table 56). One adult (Sk272) and one adolescent (Sk611) had bilateral changes to the femoral head and acetabulum which indicated they had suffered from congenital hip dislocation. The adult case also showed evidence of the formation of false joint surfaces as a result of the untreated dislocations. The condition occurs from birth and as it remained untreated had probably resulted in walking difficulties and gait problems for the individuals.

The final dislocation was identified on the right mandibular condyle of a mature adult female. Her joint contour change and remodelling of both the condular head and mandibular fossa was interpreted as the result of dislocation.

Soft tissue injuries

Soft tissue injury in the form of strains, sprains and tears of muscle, tendons and ligaments is undoubtedly common. Soft tissue injuries happen frequently but their skeletal signature is limited to secondary effects on the bone. These effects are various and often vigorously debated, as in the case of entheseal change at muscle and ligament attachments. However, most researchers are in agreement that avulsive injury calcification of muscle tissue known as myostitis ossificans traumatica (MOT) is a reliable indicator of such injuries.

Seven skeletons were identified with avulsive injuries in the St Nicholas assemblage, six females and four males, although none were true muscle ossification as a result of trauma (Table 57) The most commonly site of injury was the fibula, with ossification of the ligament attachment at the tibio-fibula joint most commonly seen.

Sk No	Sk Age	Sex	Sk Phase	Main Phase	Site
55	MA	M	4B	B	Left fibla
112	MA	F	4B	B	Proximal right fibula at interosseous crest;
274	MA	F	4B	B	Femur head at ligamentum flavum
330	MA	F	3B	A	Left tibiofibula joint
698	MA	F	2-3	A	Distal left femur
809	MA	M	1-2	A	Right tibiofibula joint

Table 57 Individuals with soft tissue injuries

Osteochondritis Dissecans

Osteochondritis dissecans, is characterised by a loose piece of bone or cartilage separating from the joint surface of the bone because of a loss of blood supply. Skeletally this often manifests as a necrosis of the joint surface and if excavation recovery strategies have been good, a corresponding plug of bone can potentially be recovered. Occasionally the joint surface will be seen to have reabsorbed the necrotic 'plug' as part of the healing process.

Sk No	Sk Age	Main sex	Sk Phase	Main Phase	Site
479	A		3A	A	Proximal tibia;
576	YA	F	2-3	A	Right distal femur
673	C		2-3	A	Left distal humerus
766	MA	F	2-3	A	Left distal humerus;

Table 58 Individuals with osteochondritis dissecans

In total, four cases of osteochondritis dessicans were indentified from the St Nicholas assemblage (Table 58). All were from phase A and were spread across a range of ages. Two cases involved the knee joint, which is generally seen to be the most commonly affected (Williams et al 1998) and two involved the elbow. The crude prevalence rate for phase A is thus 0.83%.

Chapter 9 Metabolic diseases

By Paul RJ Duffy

Osteoporosis

Osteoporosis is seen as the most common of the skeletal metabolic diseases and is most commonly correlated with age, although diet, sex, exercise number of pregnancies, smoking, caffeine and alcohol also have some part to play in the propensity to develop the disease in modern populations (Roberts and Manchester 1997, 177). As an individual ages, and after approximately the fourth decade, the turnover of new bone within the skeleton decreases and bone is increasingly lost more than it is created. The main result of the condition are a decrease in density of the cortical bone and a reduction in strength of the micro architecture of the trabecular bone, where micro fractures to the trabecular structure and poor healing of these features can often be seen under magnification. Clinically, osteoporosis defined by the World Health Organization in women as a bone mineral density 2.5 standard deviations below the peak bone mass based on a 20-year-old healthy female average. Where bone thinning can be measured and associated micro-fractures of the trabecular bone have resulted in osteoporotic fractures it is said to be established osteoporosis. Women are more generally affected than men.

In skeletal analysis, however, no such criteria exist and instead diagnosis often tends to depend on the subjective assessment of the weight, cortical thickness and trabecular appearance of the bone. This is the criterium that was used in the investigation of this assemblage.

Sk	Age	Sex	Phase	Main Phase
94	A	F	4B	B
159	MA	F	4B	B
217	MA	F	4B	B
604	OA	F	2-3	A
766	MA	F	2-3	A
808	MA	F	1-2	A
861	OA	M	2-3	A
872	YA	F	2-3	A

Table 59 Individuals with osteoporosis

In total eight cases of osteoporosis were recorded from St Nicholas, five from phase A and three from phase B (Table 59). All of the affected individuals were female, except for one older adult male from phase A.

	M	F	All	CPR%M	CPR%F	CPR%All
A	1	4	5	0.89% (n=112)	5% (n=80)	2.16% (n=231)
B	0	3	3	0% (n=75)	4.28%(n=70)	1.42%(n=210)
All phases	1	7	8	0.5% (n=195)	4.32%(n=162)	1.7% (n=468)

Table 60 Crude prevalence of osteoporosis

Prevalence rates were unsurprisingly higher for females than males (Table 60). Within the female population the prevalence rate is relatively steady between the early and later phases, although the small sample size must be borne in mind. The overall prevalence rate for the

disease is towards the lower end of those reported for comparable later medieval assemblages from Britain but is within the reported range. It of interest to note that prevalence rates are significantly lower than would be expected from a modern population, a fact which is an expression of the changed population demographic between the later medieval period, where reaching advanced old age was a less certain proposition than it is today.

Rickets

Rickets is a softening of bones in children potentially leading to fractures and deformity. The predominant cause is a vitamin D deficiency, but lack of adequate calcium in the diet may also lead to rickets. Often, it is suggested, rickets is a disease of the urban poor who are supposed to have suffered from lack of sunlight (the major source of vitamin D) as a result of cramped and smoky living conditions (ie Roberts and Manchester 1997; Brickley et al 2006). Although it can occur in adults, the majority of cases occur in children. Here the affected children will develop characteristic bent limbs, initially the upper limbs as a result of crawling and subsequently the lower limbs when the individual child learns to walk if the condition persists. The effects of rickets in the form of deformed limbs can persist long into adulthood. Osteomalacia is the term used to describe a similar condition occurring in adults, generally due to a deficiency of vitamin D. This primarily affects the vertebrae and pelvis rather than the limbs.

		I	C	YA	MA	A	All
No of	A	8	6	4	1	1	20
affected	B	7	2	4	2	2	17
individuals	All	15	9	8	5	4	41
Total	A	97	111	58	77	84	482
number in	B	65	43	39	57	103	346
population	All	175	173	102	141	202	891
Crude	A	8.25	5.41	6.90	1.30	1.19	4.15
Prevalence	B	10.77	4.65	10.26	3.51	1.94	4.91
Rate%	All	8.57	5.20	7.84	3.55	1.98	4.60

Table 61 Instances and prevalence of rickets

In total 41 cases of rickets and healed rickets were identified in the St Nicholas assemblage (Table 61). The overall prevalence rate for the disease is 4.6 % which is quite high for a British assemblage. This may, in part be due to the diagnosis criteria, which included infant examples where manifestation of the disease was apparent as flaring of the metaphseal ends of the long bones and irregular porosity at the ends of the ribs, rather than just the classic signs of long bone deformation. Even allowing for this, the prevalence of rickets is 2.9% which is still is a relatively high in a British context. Clearly there is an underlying environmental factor affecting the populations of both the early and late phases of the church.

Most of the individuals had the familiar bowing of long bones as an indicator of the disease. One individual however had suffered extensive skeletal changes. She was a mature adult female from phase A (Sk294) who, as well as bowing of both humerii, had a double curvature of the spine towards the right, at the level of L1 and L2, and a return towards the left at T4-T8. The ribs were also contorted towards the caudal end, probably as a result of this condition. It is considered that the two conditions were probably related (Ortner 2003).

Cribra Orbitalia and Porotic Hyperostosis

Cribra orbitalia and porotic hyperostosis are the skeletal manifestations of iron-deficiency anaemia in the eye socket and on the outer table of the skull respectively. Both conditions are characterised by a pitting of bone as a result of thinning of the trabecular bone in response to an enlargement of the dipole of the skull. This enlargement is generally held to be an osseous attempt to increase the storage of iron rich blood cells in response to a deficiency. There are many causes of iron-deficiency anaemia, amongst the most common being lack of absorbable iron in the diet and a high pathogen load within the body (Stuart Macadam 1992; Grauer 1993; Ortner & Putschar 1981).

Category		Foetal	Peri	Infant	Child	Adol	YA	MA	OA	A	Total
Number of Individuals	A	1	5	7	12	1	2	7	2	9	46
	B		1	7	4	1	2	5	0	3	23
	All	1	6	14	16	2	4	12	2	12	80
Total Number in population	A	3	14	42	57	8	25	38	7	55	234
	B	1	6	24	22	1	15	27	3	38	155
	All	5	21	70	85	12	42	68	10	103	441
Crude Prevalence rate%	A	33.33	35.71	16.67	21.05	12.50	8.00	18.42	28.57	16.36	19.66
	B	0.00	16.67	29.17	18.18	100.00	13.33	18.52	0.00	7.89	14.84
	All	20.00	28.57	20.00	18.82	16.67	9.52	17.65	20.00	11.65	18.14

Table 62 Individuals with cribra orbitalia by age

	M	F	CPR%M	CPR%F	CPR%All
A	10	6	0.89% (n=112)	5% (n=80)	2.16% (n=231)
B	4	5	0% (n=75)	4.28%(n=70)	1.42%(n=210)
All phases	16	12	0.5% (n=195)	4.32%(n=162)	1.7% (n=468)

Table 63 Individuals with cribra orbitalia by sex

In total 80 individuals from the St Nicholas assemblage were identified with cribra orbitalia in one or both orbits (Table 62). The numbers and prevalence rates for the various age categories are presented in Table 63 above. In general, prevalence in non adults (20.20%, n=193) was greater than in adults (13.45%, n=223). Females also suffered much higher instances of cribra orbitalia than men consistently in both phase A and phase B. Overall prevalence rates are also consistent with those reported from other British sites. Adolescents and perinates showed the highest prevalence of all the age categories but generally numbers of affected individuals analysed by age were small and results are potentially misleading. What is clearer is that overall there is a decrease in the prevalence of cribra orbitalia from phase A to phase B suggesting some form of change in environmental factors affecting iron deficiency in the later population. There would also appear to be a sex difference between male susceptibility and female susceptibility, most probably to do with the affects of iron loss during the menstrual cycle.

Two cases of porotic hyperostosis were also identified, both from phase B. The first was an adult of unknown age and sex (Sk142) who showed thickening of the dipole and exocranial porosity on the frontal, left parietal and occipital. The second individual was a child who showed similar changes to the right parietal and also suffered from cribra orbitalia.

Chapter 10 Tumours

By Paul RJ Duffy

Benign tumours

Osteoma

An osteoma is a piece of normal bone usually growing on another piece of bone, typically the skull. It is a benign tumour and of little clinical significance which commonly affects men more than women and occurrences generally peak in the fourth and fifth decade of life. An osteoma is a primary neoplasm and is unrelated to outside pathological processes.

Sk No	Sk Age	Sex	Sk Phase	Main Phase	Description
85	MA	M	4B	B	Medial aspect
222	MA	F	4B	B	Frontal sinus
228	A	M	4B	B	Left Parietal
277	A	M	4B	B	Right Parietal
308	MA	M	4B	B	L Mandible (mylohyoid bridge)
799	MA	M	2-3	A	Frontal
883	A		2-4		Right tibia (distal medial aspect)

Table 64 Individuals with osteomas

In total seven individuals from the St Nicholas assemblage were found to have benign osteoma (Table 64). Most affected the skull with only one example (Sk 883) being found on the post-cranial skeleton. Most of the individuals affected were from phase B and most were male. The crude prevalence rate for the adult assemblage is 1.28%

Osteochondroma

An osteochondroma is a cartilage-covered bony excrescence (exostosis) that arises from the surface of a bone. Osteochondromas, which are the most common bone tumors in children, may be solitary or multiple, and they may arise spontaneously or as a result of previous osseous trauma. An osteochondroma can affect any bone preformed in cartilage. Most osteochondroma, solitary or multiple, arise from tubular bones and are located in the metaphysis.

Only one individual was found with an osteochondroma from the St Nicholas assemblage. The individual was a mature adult female from phase B who had a lesion on the medial aspect of the proximal midshaft of the left femur.

Malignant tumours

Metastatic Disease

A metastatic cancer is so defined when a cancer spreads (metastasizes) from its original site to another area of the body. Metastases spread in three ways - by local extension from the tumor to the surrounding tissues, through the bloodstream to distant sites or through the lymphatic system to neighbouring or distant lymph nodes. Virtually all cancers have the potential to spread this way. Whether metastases develop depends on the complex interaction of many tumour cell factors, including the type of cancer, the degree of maturity (differentiation) of the tumour cells, the location and how long the cancer has been present, as well as other incompletely understood factors.

Skeletally the presence of a metastatic cancer is identified through multiple lesions throughout the body. When primary cancers arise from the lung, thyroid, kidney and gasteoenteritic cancer the resulting lesions are osteolytic resulting from osteoclastic activity. In the case of a pituitary origin the lesions are visible as new bone growth resulting from osteoblast stimulation, whilst cancers arising from the breast normally show a mixture of both features.

SkNo	SkAge	Sex	Phase	Main Phase	Description
106	MA	M	4B	B	Possible lung thyroid kidney etc
601	YA	M	2-3	A	Metastatic carcinoma
633	MA	F	2-3	A	Possible prostate

Table 65 Individuals with metastatic cancer

Three probable cases of metastatic carcinoma were identified in the St Nicholas assemblage, a young adult male and mature adult female from phase A and a mature adult male from phase B (Table 65). All had extensive changes throughout the body. In the first case the changes were osteoblastic and sunburst in appearance and visible at multiple sites including the spine, scapula, ribs, sternum, pelvis and sacrum, potentially suggesting a prostate origin. The second individual showed mixed osteoblastic and osteoclastic lesions focussed at the left pelvis. The third case also showed a mixture of multiple lytic and new bone formation on the ribs and vertebrae. Preservation of the latter two cases was poor and the diagnosis is therefore provisional.

Multiple Myeloma

Multiple myeloma (also known as myeloma or plasma cell myeloma) is a progressive hematologic disease. It is a cancer of the plasma cell, an important part of the immune system that produces antibodies to help fight infection and disease. Multiple myeloma is characterized by excessive numbers of abnormal plasma cells in the bone marrow and overproduction of antibodies. As tumours grow, they invade the hard outer part of the bone and in most cases, the myeloma cells spread into the cavities of all the large bones of the body, forming multiple small lesions particularly in the pelvis, spine, ribs, and skull.

Sk No	Sk Age	Sex	Phase	Main Phase	Description
507	A	F	4B	B	Lesions skull, clavicle. scapula, ribs, sternum, pelvis, femora
796	OA	M	2-3	A	Lesions ribs, vertebrae, sternum and pelvis

Table 66 Individuals with multiple myeloma

Two probable cases of multiple myeloma were identified in the St Nicholas assemblage, one old adult male (Sk796) from phase A and one adult female (Sk507) from phase B (Table 66). Both presented with multiple lytic lesions through out the skeleton, focussed on the ribs, sternum and pelvis. The preservation of the former skeleton was poor and further observation was not possible. The second case, however, presented with further lesions to the skull, clavicle. scapula, and both femora. This individual had also suffered rib fractures secondary to the presence of the myeloma.

Bone Cysts

Bone cists are fluid filled spaces originating inside the medullary cavity. Children are most commonly affected but the lesions frequently persist into adulthood. They occur most commonly in the longbones but can appear throughout the body.

Sk No	Sk Age	Sex	Phase	Main Phase	Description
0243	YA	M	4B	B	Cyst R femur lesser trochanter
0768	YA	M	M	A	Frontal cyst

Table 67 Individuals with bone cysts

Two individuals were found to have cists, both young adult males (Table 67). The first case was a cist visible on the posterior aspect of the lesser trochanter of the right femur and was observed as a small 20 mm oval lesion with a sharply defined periphery. The second was a banana shaped lesion c 15mm in length located on the right side of the frontal immediately superior to the located on the supra orbital ridge.

Chapter 11 Other diseases and conditions

By Paul RJ Duffy

A number of other diseases ad conditions were indentified in the assemblage

Perthes Disease

Perthes disease (Legg-Calve-Perthes disease, Calve Perthes disease, or avascular necrosis) is an osteochondrosis of the femoral head in children. In Perthes disease the blood supply to the growth plate of the bone at the end of the femoral epiphysis becomes obstructed. As a result the bone becomes weakened as a result of avascular necrosis softens and breaks down. The condition usually affects children from 3 to 10 years old thought the skeletal effects such as secondary osteoarthritis persist in c 38% of the population indefinitely. This percentage increases to 100% for those who develop the condition after 10 years of age. It is not clear why this blood vessel problem occurs in the femoral head. No definitive familial or hereditary features have been identified. Males are more generally affected than females.

Skeletally the final outcome of Perthes disease is deformation, widening flattening and shortening of the femoral head and shortening and widening of the femoral neck. The condition produces a characteristic ‘mushroom shaped’ femoral head and a deformed acetablulum, usually unilaterally.

Two definite cases and one possible case of Perthes disease were identified from the St Nicolas assemblage. The first of these was an older adult male (60+) from phase B (Sk162) who showed characteristic changes to the right femoral head and acetabulum indicative of the disease. The condition had resulted in secondary osteoarthritis of the affected hip joint. The second was an adult male from phase B (Sk209) who showed flattening and widening of the right femoral head and shortening and widening of the femoral neck. This had produced secondary osteoarthritis in the affected hip joint in the form of eburnation on the femoral head and acetabulum. It is likely that osteoarthritis of the left hip had resulted from the affected gait of the individual as a result of the disease.

A final possible case was identified in an adolescent from phase A (Sk611) who showed bilateral flattening of the femoral head and shortening of the femoral neck. A neo-acetabulum had also been formed on the left superior-posterior aspect. This condition is either related to Perthes disease or a congenital hip dislocation.

Congenital fusion of cervical vertebrae

A total of 6 individuals were identified as having fused cervical vertebrae at the level of C2 to C3 (Table 68). The fusion was consistent in all cases with Klippel-Feil syndrome, although wider skeletal changes were not observed on any of the individuals. The identification of this condition in these individuals is thus only probable.

Sk	Age	Sex	Phase	Main Phase
35	OA	F	4B	B
48	MA	M	4B	B
206	A	M	4B	B
357	AD		2-4	
563	C		2-3	A
613	MA	M	4B	B
701	MA	M	2-3	A

Table 68 Individuals with congenital fusion of cervical vertebrae

Klippel-Feil is a genetic disorder caused by congenital fusion of two or more vertebral segments into a block with a single spinous process, neural arch and vertebral body during embryonic development. It most commonly manifests in the cervical spine. The true incidence of Klippel-Feil syndrome is unknown. However, a study of 1400 skeletons from the Terry collection, found an incidence of 0.71%. The crude prevalence rate of 0.69% from the St Nicholas assemblage is thus broadly in keeping with this reported prevalence.

Spina Bifida

Spina bifida is the most common of all the spinal congenital defects and is identified as incomplete midline closure of one or more neural arches. Most cases occur in the lumbar sacral region of the spine where the conditions generally mild in terms of the physical effects on the individual and the general prevalence in modern populations is somewhere in the region of 25%. More serious is the condition Spina Bifida Aperta in which the spinal nerves and/or chord protrudes through the defect. The two conditions are difficult to separate osteologically, although survival into adulthood has been put forward as a useful indicator of spina bifida occulta.

	C	AD	YA	Ma	All	M	F	All
A	2	2	3	6	13	5	5	10
B	0	0	0	2	2	2		2
All	2	2	3	9	16	7	6	13

Table 69 Individuals with spina bifida

In total sixteen individuals were identified from the St Nicholas assemblage with spina bifida, seven males, six females, one unsexed adult and 4 non adults (Table 69). In general most individuals presented with changes consistent with spina bifida occulta. Three of the four children did, however, have defects other than on the sacrum and these may represent the more severe form of the disease. Overall, the crude prevalence rate for the condition was 1.45%.

Scoliosis

Scoliosis is a congenital abnormality which results in lateral curvature of the spine with rotation of the vertebrae and the spinous process towards the concavity. Scoliosis usually has a double curve to maintain alignment of the head in the usual plane. One case of scoliosis was identified from the St Nicholas assemblage. He was an older adult male from phase A (Sk627) who had showed a classic lateral curvature of the spine focussed on T3-T4 and associated asymmetry of the transverse processes. Asymmetry of the humerii, with the right being noticeably longer and more robust than the left, was also noted may also be a secondary effect of the condition.

Melorheostosis

Melorheostosis is an unusual hyperostosis related to unusual thickening of the cortical bone. It has a genetic origin and generally only affects one limb. The most readily identifiable aspect of the disease is the laying down of successive layers of cortical bone which generates a candle wax appearance to the bone. One individual, a mature adult male from phase B (Sk459) was identified with a possible case of Melorheostosis which affected the right lower

limb. The tibia and fibula were the most severely affected with diffuse bone deposition and thickening of the cortical bone which has resulted in fusion of the bones at the tibiofibular joint. The distal end of the femur also showed signs of involvement, as did the linea aspera which showed similar bone growth in the metaphysis.

Lumbarisation, sacralisation and Additional Lumbar vertebrae

A number of minor congenital abnormalities of the lower spine were also recorded. These are shown in Table 70 below. The only potentially significant finding from analysis was the slightly higher propensity of men to have sacralisation fo the first coxygeal vertebrae

	L6	S1 Lumbaraisation	L5 Sacralsiation	C1 sacralisation
A	1	1	6	6
B	2	2	3	8
M	2	0	6	11
F	0	3	3	5
All	3	3	10	16

Table 70 Vertebral anomalies of the lower spine

Chapter 12 Dentiton

By Iraia Arabaolaza

Dentition is one of the best preserved archaeological materials found in skeletal assemblages, mainly due to its composition. At St Nicholas Kirk the information gathered from the teeth included their presence or absence, as well as dental diseases such as caries, abscess, periodontal disease and/or dental enamel hypoplasia. Dental hygiene was also noted using calculus as a parameter. Dental anomalies and cultural modifications were also analysed in order to get a complete picture of the dentition on this site.

Number of teeth present

A total of 10,114 teeth, including both deciduous and permanent teeth, were studied in this assemblage. It was a good proportion of the expected teeth, 45.1 %, since 414 skeletons of the total 918 inhumations had observable dentition. A total of 8329 teeth were present, either loose or in the surviving maxillae and mandibles, and 1785 were absent due to *post-mortem* or *ante mortem* loss or simply because they were un-erupted. There is not any significant difference between the maxillary or mandibular location or/and tooth position on the dentition like anterior, pre-molar or molar.

	Anterior	Pre-molars	Molars	Total
Teeth present				
Upper	1136	811	1042	2989
Lower	1247	878	1119	3244
Total	2383	1689	2161	6233
% of total	38.2	27.1	34.6	100
Teeth absent				
Upper	185	90	216	491
Lower	144	70	235	449
Total	329	160	451	940
% of total	35	17	48	100
Grand total*	2712	1849	2612	7173

Table 71 Number of permanent teeth present including adolescent*

	Maxilla	Mandible	Total
Teeth present			
I1	175	178	353
I2	172	189	361
C	219	214	433
Dm1	225	248	473
Dm2	226	250	476
Total	1017	1079	2096
% of total	48.5	51.4	100
Teeth absent			
I1	85	98	183
I2	84	85	169
C	79	84	163
Dm1	71	81	152
Dm2	86	92	178
Total	405	440	845
% of total	47.9	52	100

Grand total	1422	1519	2941

Table 72 Number of deciduous teeth present

***Ante-mortem* tooth loss:**

The principal reason for *ante-mortem* tooth loss is periodontal disease (Chapple 2004); even though deliberate removal of teeth, accidental trauma, scurvy, advance age and fighting can also be causes.

	Anterior	Pre-molars	Molars	Total
Maxilla				
Number	31	44	108	183
% of total	8.8	12.5	30.7	52.1
Mandible				
Number	29	31	108	168
% of total	8.2	8.8	30.7	47.8
Grand total	60	75	216	351
CPR	2.2	4.05	8.26	4.89

Table 73 Distribution of *ante-mortem* tooth loss in permanent teeth

Looking at Table 73 it is clear that molars, both maxillary and mandibular, were the most frequently lost teeth. A total of 79 individuals had lost a permanent tooth during their lifetime, moreover the number increases with age. The *ante-mortem* tooth loss is quite similar in both sexes, affecting 36 females and 43 males (Table 74). One adolescent also suffered *ante-mortem* tooth loss, but it has not been included in the table since its sex is indeterminate.

	Female/?Female	Male/?Male	Total
Adult	6 (n) 7.6 %	10 (n) 12.65 %	16 (n) 20.25 %
Young Adult	5 (n) 6.3 %	9 (n) 11.3 %	14 (n) 17.7 %
Middle Adult	22 (n) 27.8 %	20 (n) 25.3 %	42 (n) 53.1 %
Old Adult	3 (n) 3.8 %	4 (n) 5.06 %	7 (n) 8.8 %
Total	36 (n) 45.5 %	43 (n) 54.4 %	79 (n) 100 %

Table 74 Proportion of individuals with *ante-mortem* tooth loss by sex and age

The *ante-mortem* tooth loss of the deciduous teeth mostly occurred on the first and second incisors, although there were two children with *ante-mortem* tooth loss of a lower canine and lower first molar. Nonetheless, most of these cases are possibly linked to normal tooth development and the natural loss of deciduous dentition. There is a case however, where a child had lost its lower right permanent second premolar during its lifetime. This *ante-mortem* loss was probably caused by a buccal abscess still visible at the lower right permanent first molar which affected the second premolar.

Plate 1

CPR for *ante-mortem* tooth loss from the total number of teeth, both present and absent, was 19% which corresponds to the average tooth loss for the period covered by other skeletal assemblages in Britain (Roberts & Cox 2003).

Dental Caries

Tooth decay, or dental caries, is a progressive destruction of the tooth structure caused by acids found in the mouth which are produced by bacteria in the presence of sugar. Factors like poor enamel quality or pathologies such as dental enamel hypoplasia can also generate favourable conditions to form dental caries (Ortner 2003), although they will not cause it on their own. Change in diet is also linked to caries since the frequency increases through history parallel to the increase of sugar and carbohydrate products consumption. When CPR was analysed by period, there was a clear increase through time. Phase A showed a CPR of 16.8% (42 individuals) while phase B had a CPR of 31.1% (51 individuals affected), nearly double. This increase could suggest a different diet or/and eating habits during this later phase which will correspond to the rising wealth of the burgh and a greater accessibility to sugar and carbohydrate food.

From the analysis of distribution, it is clear that both permanent and deciduous molars, both maxillary and mandibular, are the most recurrently affected teeth, representing more than eighty per cent of the entire carious teeth. A total of 4.25 % (CPR) of the present permanent teeth are carious, while only 0.57 % of the total deciduous had caries, a very low percentage (Table 75). When both were combined a CPR of 3.3% was obtained. The difference between sub-adults and adults could be caused by a different diet and/or a lack of dental hygiene which would get worse throughout an individuals lifetime (Table 76). A third of the sub-adults showing caries had also calculus which could support a possible relationship between the lack of hygiene and carious teeth. In contrast, only 3.5 % of permanent teeth affected by calculus showed caries.

All the caries in the sub-adult skeletons were found in children with the exception of one, which was found in an infant deciduous first molar (Table 77). This skeleton presented manifestations of possible congenital syphilis which would explain the weakening of the enamel and the subsequent formation of caries.

	Anterior	Pre-molars	Molars	Total
Upper	8	29	101	138
Lower	2	10	115	127
Total	10	39	216	265
% of total	3.7	14.7	81.5	
CPR	0.4	2.3	9.9	4.25

Table 75 Distribution of dental caries in permanent teeth

	Female/?Female	Male/?Male	Non observable	Total
Adolescent			2(n) 1.92 %	
Adult	9 (n) 8.65 %	12 (n) 11.5 %	4(n) 3.8 %	25(n) 24 %
Young Adult	16 (n) 15.3 %	9 (n) 8.65 %		25(n) 24 %
Middle Adult	26 (n) 25 %	22 (n) 21.1 %		48(n) 46.1 %
Old Adult	1 (n) 0.96 %	3 (n) 2.8 %		4(n) 3.8 %
Total	52 (n) 50 %	46 (n) 44.2 %	6(n) 5.7 %	104(n) 100 %

Table 76 Proportion of dental caries by sex and age

	Maxilla	Mandible	Total
I1	0	0	0
I2	0	0	0

C	0	1	1
DM1	5	4	9
DM2	2	0	2
Total	7	5	12
CPR	0.68	0.46	0.57

Table 77 Distribution of dental caries in deciduous teeth

Dental Abscess

Abscesses are perforations of different shape and size which occur at the alveolar bone and so, are easy to identify macroscopically. There are caused by a collection of pus which originates at the base or apex of a decay root tooth affected either by caries, periodontal disease or dental attrition (Roberts & Cox, 2003). It can lead to the loss of the affected tooth and if the infection spreads more serious complications like osteomyelitis or maxillary sinusitis can occur (Waldron 2007).

The molars, especially the upper molars, were the most affected teeth by dental abscesses (Table 78). There is not any significance difference between the prevalence of abscess in either males or females but there is an increase of the number of abscesses with age (Table 79).

	Anterior	Pre-molars	Molars	Total
Upper	8	19	47	74
Lower	13	7	24	44
Total	21	26	71	118
% of total expected	17.7	22.03	60.1	100
CPR	0.88	1.53	3.28	1.89

Table 78 Distribution of dental abscesses in permanent teeth

	Female/?Female	Male/?Male	Total
Adult	4 (n) 7 %	8 (n) 14 %	12 (n) 21 %
Young Adult	4 (n) 7 %	6 (n) 10.5 %	10 (n) 17.5 %
Middle Adult	15 (n) 26.3 %	18 (n) 31.5 %	33 (n) 57.9 %
Old Adult	1 (n) 1.75 %	1 (n) 1.75 %	2 (n) 3.5 %
Total	24 (n) 42.1 %	33 (n) 57.9 %	57 (n) 100 %

Table 79 Proportion of dental abscess by sex and age

Four abscesses were present on the sub-adult skeletons, all of them children. Two of them were related to deciduous teeth (a deciduous first molar and deciduous second molar) and the other two were associated with lower first permanent molars. Two of them presented caries on the teeth affected by the abscess; one is a deciduous first molar and the other a permanent first molar. According to Waldron (2007) it is usual to find abscess secondary to caries in children; it is the most usual aetiology.

Finally, the prevalence rates of the individuals affected by abscesses were quite similar: 22 individuals had abscess in phase A (CPR 8.8%) and 13 individuals in phase B (CPR 7.9%). The difference between the phases is not significant, however the slight decrease could be related to a better dental hygiene and/or access to dental treatment, which would be more available in a large and rich burgh such Aberdeen during 15th-18th century.

Periodontal disease

It is the manifestation of chronic infection of the gingival soft tissue which leads to a chronic periodontitis and the destruction of alveolar bone. As a result, the root of the tooth becomes exposed, and in the most severe cases, *ante-mortem* tooth loss can occur. The alveolar margin reduction occurs in two forms: horizontal or vertical (Hillson 1996). Nonetheless, during the analysis no distinction was made, only its presence and in some cases its severity, was recorded.

A total of 37 individuals were affected by periodontal disease. Twenty five of these skeletons, 67.5% of the total, also presented another or various dental pathologies in addition, indicating poor dental health. More than half of them showed caries, 40% of them had lost teeth *ante-mortem*, 37% had abscesses and 16% of the total had caries, abscesses and ante-mortem tooth loss in conjunction with periodontal disease.

When the crude prevalence rate was analysed using the different phases as parameter, a slight decrease on the number of cases was observed in phase B (7.9% CPR, affecting 13 individuals) compared to 9.6% (CPR) in phase A (24 individuals affected). As with the abscesses, the decrease in periodontal disease is possibly linked to a better care of the dentition by the inhabitants in this later period.

Dental calculus

Calculus or "tartar" is mineralized dental plaque which can be found either on the teeth crown (supra-gingival) or on the roots (sub-gingival) (Hillson 1996). In archaeological populations, calculus is a manifestation of the oral hygiene habits, although its presence and levels can also be influence by the age, diet, ethnicity and systemic diseases (White 1997).

At this site, there is a possible relation between the presence of calculus and caries in permanent dentition and also between its severity and the occurrence of more severe dental diseases (Table 80). The same can not be observed in deciduous teeth (Table 81). A total of 3441 teeth, 55.2% of the total, are affected by calculus in permanent teeth (adolescents included), while only 7.5% of deciduous teeth had any sign of calculus. It is obvious that the presence of calculus increases parallel with age and it is possibly related to a lack or poor dental hygiene.

Grade of dental calculus			
Dental disease	**Slight (2260n)**	**Medium (740n)**	**High (234n)**
Caries	95 (n) 4.2 %	12 (n) 1.6 %	6 (n) 2.5 %
Abscess	0 (n) 0 %	0 (n) 0 %	4 (n) 1.7 %
Ante-mortem tooth loss	6 (n) 0.2 %	0 (n) 0 %	1 (n) 0.4 %

Table 80 Proportion of adult individuals with dental disease by grade of dental calculus

Grade of dental calculus			
Dental disease	**Slight (137n)**	**Medium (18n)**	**High (2n)**
Caries	1 (n) 0.7 %	0 (n) 0 %	0 (n) 0 %
Abscess	0 (n) %	0 (n) 0 %	0 (n) 0 %
Ante-mortem tooth loss	0 (n) %	0 (n) 0 %	0 (n) 0 %

Table 81 Proportion of sub-adult individuals with dental disease by grade of dental calculus (only deciduous teeth)

Dental enamel Hypoplasia

Dental enamel hypoplasia refers to permanent defects that occur on the crown enamel during tooth development. Buisktra and Ubelaker (1994) differentiate several forms of defects such as: linear horizontal grooves, linear vertical grooves, linear horizontal pits, non linear arrays of pits and single pits. The deficiency is caused by episodes of stress which could be triggered by multiple factors such as malnutrition, high fever, anaemia (Hillson 1996), low birth weight (Fearne et al.1990), as well as infections, systemic diseases and birth trauma **(**Waldron.....) It is therefore an important indicator of childhood stress and population health.

A total of 109 skeletons showed signs of dental enamel hypoplasia (DEH) at St Nicholas. A young adult male (Sk203 phase B) presented a very severe case of DEH. One of its molars had plane-form defects around its cusps, which is indicative of "Mulberry molars" (defect caused by congenital syphilis). However, it is difficult to do a differential diagnosis between "Mulberry molars" and severe defects on the enamel.

A possible case of tooth root hypoplasia was also found on a child (Sk322). The teeth enamel seemed to be unaffected by the pathology, however the roots showed linear discoloration similar to the hypoplastic defects that are found in the enamel.

Plate 2

Looking at the distribution of the individuals affected by DEH through the phases there is a slightly higher number in phase A (29.2% CPR, 73 individuals) compared to phase B (21.9% CPR, 36 individuals). The decrease in the number of individuals showing signs of DEH could be linked to the increase in the wealth of the burgh inhabitants and consequent decline on the stress (eg: malnutrition, anaemia, high fever, systemic diseases) that individuals would have suffer during childhood.

Plate 3

Cultural modifications

One of the most significant and identifiable cultural modification present on the dentition was a semicircular abrasion caused most probably by clay pipe stems. "Pipe smoker's notch" was encountered on six individuals demonstrating the popularity of smoking during the 16th and 18th centuries. One individual, a middle adult female (Sk837) dated early 12th century, showed a distal abrasion on its lower right first premolar. Due to its date, tobacco was not available in Europe, and the wear must have been produced by an object, maybe linked to her occupation and not a clay pipe.

Possible early attempts at dentistry were also identified on three skeletons. Flakes of gold leaf were found on the maxillary left central incisor of a child (Sk264) aged between 7.5 and 12.5 years. The child had a mild case of DEH on both central upper incisors, but no other dental disease was recorded. The skeleton belonged to phase B, between the 15th and 18th centuries, a period when evidence of prostheses has survived archaeologically. However, the lack of any pathology, apart from DEH, which could explain the need for a treatment, makes this case more of a possible cosmetic/status feature than a prosthesis attempt.

Plate 4

Another interesting case was Sk371 (middle adult male) who had a sawed square of bone or ivory placed along the mandible. The square, which looked like a small dice without numbers, had a porous enamel looking layer on top and a wooden-like body, and it was found during cleaning next to the left lower molars. All three left mandibular molars, present dental

disease: M1 had a severe abscess, M2 had root buccal caries and occlusal caries and M3 had a severe occlusal caries which destroyed the entire tooth crown with the exception of the root, the only preserved fragment. The skeleton was phased in phase A, between the mid 12th to the 15th centuries. Medieval texts indicated that dental treatment from this period was based on herbal remedies as well as charms and amulets, occasionally bloodlettings and surgery to treat oral cancer and heal fractures and dislocations were also practised (Anderson, T 2004). There are references to dentures made of human or cow bone as early as this period, and the material from which the "dice" was produced seemed to correspond with it. Moreover, when the "dice" was placed on top of M3, substituting the lost crown, it actually gave the tooth the height of the rest of the molars, typical of a bridgework (Becker **).** However, the extensive destruction suffered by the teeth, the abscess and the pain that this treatment would cause suggests that the "dice" would most likely be a charm than prosthesis.

Plate 5a & b

Finally, there was a possible case of artificial removal of teeth on a child, Sk779. Both mandibular deciduous second incisors, right canine and right first molar were absent, although the root of the second incisors was still *in situ* indicating that these tooth were either removed or broken *ante-mortem*. A fall or a facial injury could also explain the loss of these anterior teeth, since due to their position they are usually affected by accidents. The canine and the first molar seemed to have been also removed since there is no any sign of permanent dentition erupting. The alveolar process was smooth and remodelled and the individual was not of an age in which it could have lost these teeth through development. However, the same can not be said about both incisors.

Congenital conditions

A few individuals from St Nicholas presented congenital abnormalities. Un-erupted teeth and retention of deciduous dentition were some of them. In addition, shovelled incisors or shovel shaped incisors were visible in two skeletons from different phases. Another repetitive congenital condition was "peg incisor"; visible in three individuals. A peg molar was also noted in an inhumation.

Conjoined deciduous first and second right maxillary molars were present in an infant. Rotated teeth, mostly canines, impacted molars and displaced second premolars were also noted, as well as an accessory root furcation on both mandibular first molars.

Plate 1 Sk 713 showing antemortem tooth loss and abscess

Plate 2 Sk 135 showing a severe case of dental enamel hypoplasia (DEH)

Plate 3 Sk 322 showing root hypoplasia on both first incisors and second left incisor (**needs arrows**)

Plate 4 Sk 264 showing flake of gold leaf (**Needs arrows**)

Plate 5a

Plate 5b
Sk 371 showing “dice” and positioning of the “dice” on top of third right molar’s root.

Chapter 13 Disarticulated human remains

By Maureen C. Kilpatrick

Introduction

In total, 3.5 tonnes of disarticulated human bone was recovered during the excavations at St Nicholas Church. This bone was excavated from 1001 contexts which were later sub-divided into 32 phases (see Tables 82, for phasing).

Recording

During post-excavation analysis all the disarticulated human bone was entered in an inventory where each element was identified, measurements taken for metric analysis, non-metric data was recorded and sex and age were calculated when available. Descriptions of pathological lesions were recorded and digital photographs taken when required.

Minimum Number of Individuals

The Minimum Number of Individuals (MNI) was determined by identifying the most frequently repeated skeletal elements present and on greatly differing biological age (i.e., adult and sub-adult) when available. This was initially performed for each context with sub-adult remains further divided into foetal, infant, child and adolescent, when the data was available. The number of adult male and female individuals was recorded in each context again when the data survived. Due to the large number of elements only adult and sub-adult have been calculated for each phase (see Table 82).

Pathology

Diagnosis of disease in human remains generally relies on the survival of certain skeletal elements and the distribution pattern of pathological lesions to ascertain specific diseases. Due to the disarticulated nature of the remains, the recognition of certain pathologies proved difficult and diagnosis of disease has tended to be more general. Several pathologies such as dental disease and degenerative changes and certain fractures were able to be recorded with more certainty. Dental disease has not been included here, but a full record can be found in the inventory for each context.

Unfortunately, the Crude Prevalence Rate (CPR) for individual pathologies was not calculated due to the site's prolonged period of use and the difficulty of defining complex chronological phasing into more meaningful time divisions: several phases encompass an extended period of time.

All the pathology found in each context has been recorded on a table with descriptions of some of the more interesting pathology highlighted (see Table 82). It must be noted however, that several of the pathologies have been entered under headings which may suggest a definitive diagnosis. This is not the case and the headings have been used merely as a means of presenting the data meaningfully. More detailed descriptions can be found in the skeletal inventory.

PHASE 1

Context	Element	Pathology		
		Arthritis	Trauma	Congenital
		DJD/OP	Distal Shaft Fracture	Occipital Bun
1210	Talus/R	1		
1731	Fibula/R		1	
2717	Skull			1

PHASE ?1

Context	Element	Pathology		
		Arthritis	Non-metric	
2473		SJD/OP	Sagittal Suture	Condular Canal
	Thoracic Vert (T12)	1		
	Cranium		2	1

PHASE 2-3

Context	Element	Pathology		
		Arthritis		Congenital
		OA	SN	SBO
132	Radius/R	1		
	Lumbar vert		1	
	Sacrum			1

Context	Element	Pathology				
		Arthritis	Trauma	Congenital	Metabolic	DISH/AS
		SJD/OP	Wedge Fracture	Sternal end fusion	CO	AS
676	Lumbar vert (L5)	1	1			
	Frontal/L s/a				1	
	Rib/R s/a			1		
	Thoracic vertx2					?1

A sub-adult right rib with a bifid sternal end was located in the above context

Two fused thoracic vertebrae which were fused at the intervertebral space were also recovered. No changes that would suggest that this fusion was caused by degenerative changes were observable. At present the cause remains unknown although AS is a possible suggestion.

Context	Pathology													
809	Arthrits				Trauma		Tumour	Non-metric Traits		Congenital			Infection	Unknown
Element	OA	SJD/OP	DJD/OP	SN	Mid-shaft fracture	Medial end fracture	Osteod Osteoma	Apical Bones	Asterionic Bones	Fused foot phalanges	Peg Incisors	Occipital Bun	NSI	Avascular Injury/?Perthes Disease/Slipped Femoral epiphyses
Fibula/					1									
Clavicle/R						1								
Cervical vert		1												
Cervical vert (C7)		1												
Thoracic vert		1												
Thoracic vert	1													
Thoracic vert (T11)		1												
Lumbar vert				1										
Int+Distal foot phalanges										1				
Loose teeth (P)											1			
Skull								1	1			1		
Femur/L							?1							
Frontal s/a													?1	
Femur/R														1
Innominate/L			1											
Patella/R	1													

Context (809) contained a fully fused right femur with a flattened femoral head and shortened neck. The head also contained osteophytes around its rim. A tentative diagnosis of an avascular injury to the femur or even Perthes disease was considered. Unfortunately, its associated innominate bone was not present to aid a more conclusive diagnosis.

A further fully fused left femur contained a small oval shaped lesion which was interpreted as a possible Osteod osteoma. This was located on the anterior midshaft location.

Two foot phalanges comprising the intermediate and distal was also located in this context and were diagnosed as possible congenital fusion.

A fragment of sub-adult cranium was also analysed that contained a small area of porosity on the exocranial surface. The cause of this porosity is unknown but infection is a possible cause.

Context	Element	Pathology	
		Arthritis	Trauma
		SJD/OP	Sternal end fracture
1141	Rib/L		1
	Lumbar vert	1	

Context	Pathology									
1719	Arthritis				Trauma		Congenital		Metabolic	Infection
Element	OA	SJD/OP	DJD/OP	SN	BFT	Spondy-lolysis	SBO	Occipital Bun	CO	Maxillary Sinusitis
Trapezium/Lx2	1									
Patella/R	1									
Patella/R			1							
Cervical vert	1									
Thoracic vert				1						
Thoracic vert		1								
Lumbar vert		5								
Lumbar vert				2						
Lumber vert (L2)		1								
Lumber vert (L2)				1						
Lumber vert (L3)				1						
Lumber vert (L5)						1				
Sacrumx2							1			
Maxilla/L										1
Maxilla/L+R s/a										1
Maxilla/R										1
Frontal R+L s/a x3									1	
Skull					1			1		

The above deposit contained several pathologies of interest. A probable male skull contained a small blunt force trauma wound on the right frontal bone. The wound was only slightly depressed with no radiating fractures evident. The bone had evidence of healing.

A lumber vertebra was also located with missing neural arches and was a probable case of spondylolysis.

Two adult sacrum were also recovered which contained evidence of Spina bifida occulta, the neural arches were open from S3-S5 in both elements.

Three maxilla were also recovered which contained porosity and new bone formation indicative of maxillary sinusitis with two of probable dental origin. The third was from an individual of 3-5 years of age.

Cribra orbitalia was found in the bilateral eye orbits of a further three individuals. All were children between the ages of 6 - 11 years old and were graded severe.

Context	Pathology																		
1720	Arthritis					Trauma			Tumour	Non-metric Trait					Congenital		Infect-ion	DISH/AS	Medical Treatment
Element	OA	SJD / OP	DJD / OP	SN	?Septic Arthritis	Proximal shaft fracture	Wedge Fracture	Soft tissue fusion	?Neoplastic lesion	Meto-pism	Lambdoid Ossicles	3rd trochanter	Acc Ac Artic Facet	Mandibular Tori	Radial-Ulnar Syno-stosis	Occipital Bun	NSI	DISH	Dental Bridge (gold wire)
Scaphoid/L	1																		
Clavicle/R	1																		
Thoracic vert		1																	
Thoracic vert (T12)				1															
Ulna/R					?1												?1		
Fibula/R																	1		
Radius-Ulna/R															1				
Mandible														1					
Skull											1					1			
Femur/R												2							
Scapula/L													1						
Rib/L 12th									1										
Frontal										1									
Fibula/R			1			?1		1											
Tibia/R			1					1											
Thoracic T6+T7		1					1												
Innominate/L+Sacrum			?1															?1	
Mandible																			1

A probable male mandible was recovered that contained evidence of dental care. This was characterized by a small piece of rolled gold wire that had been looped around the left 1st and right 2nd incisors. The right 1st incisor had been lost antemortem and the bone remodelled but the 2nd incisor was still *in situ.* It is possible that the gold wire contained a false tooth in the place of the missing left 1st incisor and which has now been lost.

A fully fused right ulna was also recovered that had erosive changes to its margin on the medial and lateral sides of the olecranon and coranoid process. The trochlear notch also appeared slightly larger than normal although its corresponding radius was not recovered to gage the relative sizes. Diagnosis of these lytic changes was difficult with a tentative diagnosis of possible arthritic changes occurring in the area of the elbow.

A fully fused right radius and ulna was also recovered with the fusion typical of congenital radial-ulna synostosis.

A left adult male innominate with fused 5th left lumbar vertebrae and sacrum was also found in (1720). The fusion was characterized by bony bridges on the vertebral margin of L5 to S1 and at the sacro-iliac joint. There were also enthesopathies on the margins of the iliac crest, ischial tuberosity and pubic symphysis, while the margins of the acetabulum were slightly irregular with small areas of bone formation. A cautious interpretation of DISH was ascribed to the above changes although the irregularity of the acetabulum could be the result of DJD.

A left 12th rib was also located that had small coral like lesions on its inferior border. The visceral surface had roughened new bone formation. A very tentative diagnosis of a neoplastic lesion such as a metastatic blastic lesion was considered but without the rest of the individual for analysis this is predominantly a speculative view.

Context	**Element**	**Pathology**					
		Arthritis				Infection	Unknown
		OA	SJD/OP	DJD/OP	SN	NSI	?Trauma/Neoplasm
1754	Patella/R			1			
1760	Lumbar vert		1				
	Femur/R			1			
	Par Squama s/a					?1	
1761	Metacarpal (MC4)/L	1					
	Lumbar vert				1		
1762	Lumber vert (L5)	1					
1780	Trapezium/R	1					
	Cervical vert		1				
	Lumbar vert				3		
	Lumber vert (L4)		1				
	Metatarsal (MT4)/R						?1

A right side Metatarsal (MT4) was recovered that contained a very irregular bony growth consisting of mature cortical bone at its distal end. The head appeared intact with the growth located on its medial side. There did not appear to be any infection or arthritic changes to the bone. The shaft had a slight lateral deviation which could indicate an earlier traumatic injury which has since remodelled, although this was inconclusive. A further possibility is that the 'new growth' is a neoplasm of unknown aetiology.

Context	Element	Pathology		
		Arthritis	Non-metric Traits	Metabolic
		SN	3rd trochanter	Rickets
1798	Lumbar vert	1		
	Femur/L		1	
	Femur/Rx3		1	
1790	Femur/L s/a			?1

Context	Element	Pathology						
		Arthritis				Trauma		
		OA	SJD/OP	DJD/OP	SN	Distal Fracture	Non-union Fracture	Enthesopathy
1799	Proximal hand phalange	1						
	Metacarpal (MC2)	1						
	Patella/R			1				
	Clavicle/Rx2			1				
	Lumbar vert (L5)		1					
	Lumbar vert x2				1			
	Lumbar vert x2		1					
	Lumbar vert (L4)		1					
	Radius/L			1				
	Ulna/L					1		
	Lumbar vert (L1/L2)						1	
	Clavicle/R							1

This context contained a 1st or 2nd lumber vertebra with a probable non-union fracture at the right lamina on the right side only.

Context	Element	Pathology				
		Arthritis	Arthritis	Non-metric Traits	Metabolic	Infection
		SJD/OP	SN	3rd trochanter	CO	Max Sinus
1802	Femur/R			1		
	Lumbar vert		1			
1865	Maxilla/R s/a					1
2025	Lumbar vert (L4)	1				
	Lumbar vert (L5)	1				
	Frontal/R s/a				1	

Context	Element	Pathology					
		Arthritis		Non-metric Traits		Congenital	
		SN	SJD/OP	Apical Bones	Plaque	Occipital Bun	Fusion
2028	Thoracic vert (T12)	1					
	Lumbar vert	1					
	Skull			1		1	
	Femur/R				1		
2035	Thoracic vert		1				
	Int+Distal Foot phalanges						1

This context contained a further example of fused intermediate and distal foot phalanges. No obvious bone formation or destruction was noted around the fusion site and it was presumed that the fusion was congenital in origin.

Context	Element	Pathology	
		Trauma	Non-metric Trait
2039		Distal shaft Fracture	3rd trochanter
	Tibia/R	1	
	Femur/R		1

Context	Element	Pathology					
		Arthritis			Non-metric Traits		Unknown
		OA	SJD/OP	SN	3rd trochanter	DSA	Fused ?congenital
2045	Patella/L	1					
	Thoracic vert (T12)		1	1			
	Lumbar vert			1			
	Femur/L				1		
	Femur/R				1		
	Humerus/R					1	
	Fused Thoracic vertsx2						1

Two fused thoracic vertebrae were recovered from this context. They were fused on the left side at the transverse and spinous processes. There also appeared to be partial fusion of the inferior and superior right articular facets. No lytic changes or osteophytosis was observed to suggest that this fusion was the result of degenerative changes. The cause of this fusion is unknown. It is possibly congenital in origin.

Context	Element	Pathology
		Non-metric Trait
		3rd trochanter
2052	Femur/R	1

Context	**Pathology**												
2068	Arthritis				Trauma		Non-metric Traits			Metabolic	Congenital	Infection	Unknown
Element	OA	SJD/OP	DJD/OP	SN	Distal shaft fracture		Metopism	Lambdoid Ossicle	3rd trochanter	CO	Occipital Bun	Osteomyelitis	?DISH/Pagets
Thoracic vert (T11)		1		1									
Lumbar vert		1											
Innominate/L	1					?1							
Ulna/R					1								
Lumbar vert (?L2+L3)	1	1											
Skull								1			2		
Frontal							1						
Femur/L									1				
Femur/R									2				
Mandible												?1	
Innominate/R													?1
Frontal R+L s/a										1			

A left pubic symphysis was recovered that had osteoarthritis on its surface. Unfortunately, due to its very partial nature it was impossible to suggest if it came from a male or female individual. The cause of this osteoarthritis is unknown, but trauma following childbirth could be a consideration, although this is only speculation.

Another right innominate was recovered from this context that contained severe hypertrophic bone growth on the ischium and pubis. The ilium appeared normal except for slight bone growth in the area superior to the auricular surface. The pubic foramen was narrowed due to bone growth in its margins. The ischium was very roughened and slightly larger than normal. The pubic symphysis was enlarged and very irregular with new cortical bone growth and its surface had effectively been obliterated due to this. There was also severe hypertrophic bone growth at its margins. The acetabulum appeared normal. Diagnosis of this abnormal bone growth proved difficult although DISH and Pagets disease were a consideration, although the cause is still unknown. The innominate was from a male individual.

A mandible was also recovered that contained a small sinus on the left inferior surface near to the mental foramen. Its sides were very smooth and rounded with the surrounding bone slightly thickened. The sinus did not appear to 'track' to the dentition and therefore is not thought to be dental in origin. It was interpreted as a possible case of osteomyelitis with healing evident.

Context	Element	Pathology	
		Arthritis	Trauma
		SJD/OP	Spondylolysis
2072	Lumbar vert (L5)		1
2081	Lumbar vert	1	

Context	Element	Pathology				
		Trauma	Non-metric Traits		Congenital	Infection
		BFT	Lambdoid Ossicle	Plaque	Occipital Bun	NSI
2084	Frontal/R	1				
	Skull		1			
	Femur/L			1		
	Ulna/L					1
	Skull				1	

This context contained a female skull with a small oval shaped depressed fracture on the right frontal boss. The sides were very smooth indicative of healing.

Context	Element	Pathology			
2122		Arthritis	Trauma	Non-metric Trait	Infection
		SJD/OP	Distal shaft fracture	3rd trochanter	NSI
	Femur/L			1	
	Tibia/R				1
	Frontal/R s/a				1
	Ulna/L		?1		
2140	Thoracic vert (T11)	1			

2160	Thoracic vert	1			
2162	Lumbar vert	1			
2166	Patella/R	1			

Context	Element	Pathology			
		Arthritis			Congenital
		OA	SJD/OP	SN	Occipital Bun
2172	Femur/R	1			
	Cervical Vert		1		
	Lumbar vert (L2)		1	1	
	Skull				1

The lateral epicondyle of a right fully fused femur was recovered from the above context. It had severe eburnation and striation with slight erosion to the surface in the form of pitting. There was also severe osteophyte formation on the joint of the epicondylar margin. Osteoarthritis was diagnosed.

Context	Element	Pathology	
		Non-metric Trait	Congenital
		3rd trochanter	Occipital Bun
2178	Skull		1
2181	Femur/L s/a	1	
2317	Femur/R	1	

Context	Element	Pathology					
		Arthritis	Trauma	Congenital	Metabolic	Infection	Unknown
		DJD		Occipital Bun	CO	Osteomylitis	Develop-mental
2358	Femur/L	1					
	Sacrum s/a						?1
	Frontal/R s/a				1		
	Skull			1			
	Skull/L				1		
	Metacarpal/R (MC2)		?1			?1	
	Tibia/L					1	
	Occipital			1			

A grossly enlarged and thickened left adult tibia was recovered from this context. The enlargement was predominantly found at the proximal and midshaft areas with the distal affected to a lesser degree. The proximal end, proximal and midshaft surfaces showed extensive remodelling of the periosteum with porous hypervascular bone with occasional areas of sclerotic hardening. A large cloaca was evident on the medial and lateral surfaces with the medullary cavity fully exposed. The cavity appeared very narrow while the

surrounding bone was thickened and porotic. At the lateral side there was sequestra in the sinus cavity. The head of the left fibula had also ankylosed to the tibia. Unfortunately, only its head was present, the rest of the bone had been lost post mortem. A diagnosis of osteomyelitis was given.

A further possible case of possible osteomyelitis was found on a 2nd metacarpal bone.

A sub-adult sacrum was also found where the first 3 sacral segments appeared to be misaligned in a left lateral direction. There were no signs of trauma, infection or arthritic changes to suggest a possible cause. A possible developmental cause was considered.

Context	Element	Pathology	
		Arthritis	Dental
		DJD/OP	
2359	Scapula/R	1	
	Mandible		1

A fragmentary mandible was recovered that had a right lower canine located within the mandibular bone in a horizontal position below the roots of the 1st incisors.

Context	Element	Pathology	
		Arthritis	Unknown
		SN	Developmental
2366	Thoracic vert	1	
	Thoracic vert		?1

Both the right and left lateral sides of a thoracic vertebra were found to have small areas of interruption in the cortical bone immediately below the superior rib articular facets. The vertebra was otherwise normal in appearance. These small areas were roughly round in shape (diameter 6.5 mm) with smooth rounded edges. No infection was present. The trabecular bone below had been exposed on the right side but not on the left. The cause of this defect was unknown but could be developmental.

Context	Element	Pathology						
		Arthritis			Congenital	Metabolic	Infection	
		SJD/OP	DJD/OP	Erosive Arthropathy	Occipital Bun	CO	NSI	Abscess
2368	Frontal/L s/a					1		
	Thoracic vert	1						
	Skullx3				1			
	Palatine/L							1
	Tibia/R						1	
2416	Rib/R		1					
2441	1st fused prox+distal Foot Phalanges			?1				

A fused 1st proximal and distal foot phalange was recovered from the above context. The distal articular surface of the proximal phalange had been destroyed during fusion to the distal

phalange at its proximal surface. The ankylosis was characterized by erosive and reactive bone formation. There was also slight erosion at the proximal end of the proximal phalange on the lateral side. The conjoined distal phalange also had a slight lateral deviation. A diagnosis of a possible erosive arthropathy was suggested. There was no evidence of trauma to suggest that this had been a predisposing factor.

Context	Element	Pathology					
		Arthritis			Non-metric Trait		Infection
		OA	SJD/OP	SN	Metopism	3rd trochanter	NSI
2446	Occipital						1
	Tibia/L						1
2449	Radius/L		1				
	Cervical vert	1					
2452	Femur/R					1	
2456	Lumber vert (L3)			1			
2477	Lumbar vert		1	1			
2483	Femur/R					1	
2501	Skull				1		

Context	Element	Pathology					
		Arthritis		Arthritis	Congenital	Metabolic	Infection
		OA	SJD/OP	DJD/OP	Occipital Bun	CO	Max Sinus
2512	Maxilla/L						1
2621	Frontal/R s/a					1	
2644	Scapula/L			1			
	Lumbar vertx4		1	1			
2760	Maxilla/L+R						1
	Skull				1		
Additional bone with sk618	Metatarsal (MT1)/L	1					
QS	Maxilla/L						1
[AII]	Clavicle/R		1				

Phase 2-4B

Context	Element	Pathology
		Non-metric Traits
		3rd trochanter
(799 or 1799)	Femur/R	1

PHASE 1-2

Context	Element	Pathology					
		Arthritis			Non-metric Traits	Metabolic	Infection
		O/A	SJD/OP	DJD/OP	Lambdoid Ossicles	CO	NSI
1523	Clavicle/L	1					
	Cervical Vert	1					
	Thoracic Vert		1				
	Lumber Vert		1				
	Scapula/R			1			
	Cranium s/a				1		
1986	Frontal/R s/a					1	
	Ribs/R x5						1

Five right rib shaft fragments were recovered that had periosteal new bone formation on their visceral surfaces. This new bone was white/grey in colour and quite thick. It was located on all the visceral surfaces of the ribs but was particularly abundant on the inferior sides. A non-specific infection which was active at death was suggested as a possible cause.

Context	Element	Pathology	
		Arthritis	Trauma
		SJD/OP	Distal fracture
2494	Lumbar Vert	1	
	Ulna/L		1
2521	Rib	1	

PHASE 3

Context	Element	Pathology				
		Arthritis		Non-metric Trait	Metabolic	
		OA	SJD/OP	Lambdoid ossicle	Rickets/OMAL	CO (R/L)
1904	Lunate	1				
	Femur/R				?1	
	Frontal (s/a)					1
	Lumber Vert (L5)		1			
	Skull			1		

PHASE 3A

Context	Element	Pathology			
		Arthritis		Non-metric Trait	Trauma
		OA	SJD/OP	3rd Trochanter	?Myositis Ossificans
1573	Innominate/R	1			
	Cervical vert	1			
	Femur/R x2			1	
	Tibia/L				1
	Fused Thoracic vertsx2		?1		

A left fully fused tibia was recovered that located at the superior fibular articular facet was a boney formation comprising of woven and more mature cortical bone. This was interpreted as possible Myositis ossificans in response to a possible traumatic injury.

Two fused thoracic vertebra were also located in the above context. The fusion was characterized by a thick bony bridge on the antero-lateral side. SJD was diagnosed due to there being only two vertebrae present for analysis.

A right predominantly female innominate bone with an irregularly shaped acetabulum with slight osteophyte formaton and porosity within the acetabular cup and slight eburnation was also found. A diagnosis of osteoarthritis was given.

Context	Element	Pathology	
		Arthritis	Unknown
		SJD/OP	?Pagets
1578	Lumbar vert	1	
	Pariatel		?1
	Pariatel		?1

This context contained 2 small fragments of pariatel bone that were slightly thicker than normal. The first fragments exocranial surface appeared normal while the endocranial surface appeared slightly thicker than usual. The second fragment had porotic diploe with several small areas of sclerotic hardening interspersed. A very tentative diagnosis of Pagets disease was given although this is very speculative without the rest of the individual for analysis.

Context	Element	Pathology					
		Arthritis	Trauma	Non-metric Trait	Congenital		
		SJD/OP	SFT	3rd trochanter	Occipital Bun	SBA	SBO
1582	Femur/R			1			
	Femur/L x2			1			
	Femur/R s/a			1			
1585	Thoracic vert (T10)	1					
1587	Cranium				1		

	Femur/R			1			
	Sacrum						1
1735	Cervical vert (C1)					1	
	Skull		1				

A 1st cervical vertebrae was recovered which had a gap measuring 0.9 mm at its posterior neural arch. Spina bifida Atlanta was diagnosed.

A probable male skull with a sharp force trauma wound on the left pariatel bone was also recovered from the above context. The wound was linear although the edges were smooth and rounded and contained a slight depression in the internal area where healing was well advanced.

Context	Element	Pathology			
		Arthritis			Non-metric Trait
		SJD/OP	DJD/OP	SN	3rd trochanter
1737	Rib/R		1		
1745	Femur/L				1
	Femur/R x4				1
1775	Thoracic vert	1			
	Lumbar vert (L2)	1			
(1780or1736)	Lumbar vert			1	
1790	Femur/L				1
	Femur/R				1

Context	Element	Pathology			
		Arthritis		Infection	DISH?AS
		SJD/OP	DJD/OP	NSI	
1903	Clavicle/L		1		
	Clavicle/R		1		
	Fused Thoracic+Lumbar vert	1			
	Lumbar vert	1			
	Skull (occipital) s/a			1	
	Fused Thoracic vertsx7	1			1
	Innominate Pubis/R+L				?1
	Pelvis/R+L				?1

An occipital bone was recovered from a sub-adult individual that had new grey woven bone formation around the cruciform eminence which had vascular impressions. The aetiology was unknown although was interpreted as a possible Non-specific infection.

Seven fused thoracic vertebrae were also recovered from (1903). This fusion was characterized by marked hypertrophic bone growth in the right anterolateral side of the bodies that had resulted in fusion. Five of the rib head on the right side and one on the left side had also become fused. Slight osteophytic growth was also observed on the inferior left lateral

side of the lowest fused vertebrae (T10). An interpretation of probable DISH with SJD was given to the vertebral fusion.

A fused right and left innominate and sacral (S1) from a probable male individual was also recovered. This fusion at both sacro-iliac joints was characterized by intra-articular fusion with no obvious syndesmophyte formation surrounding the joint margin itself. Both right and left iliac crests had severe bone formation as had both ischial tuberosities. Diagnosis would suggest AS, however, a differential diagnosis of DISH would also have to be given

Two fragments of fused left and right pubic symphysis from a male individual were also recovered. The fusion was of smooth cortical bone which provided a bony bridge between both right and left posterior surfaces. The joint space had been maintained. The anterior surface of both bones was also roughened. A possible diagnosis of DISH was given.

Context	Element	Pathology				
		Arthritis	Tumour	Non-metric	Metabolic	Infection
		SN	Osteoid Osteoma	3rd trochanter	?Rickets/OMAL	Max Sin
1915	Thoracic Vert	1				
	Lumbar Vert	1				
	Femur/L s/a			1	1	
	Maxilla/L s/a					1
	Tibia/R s/a		1			

A small lesion located on the anterior midshaft of a sub-adult right tibia was recovered in (1915). This was diagnosed as a possible Osteod Osteoma.

Context	Element	Pathology			
		Arthritis	Trauma	Non-metric Trait	
		DJD/OP	BFT	3rd trochanter	DSA
1918	Femur/R			1	
1989	Femur/L			1	
2010	Innominate R	?1			
2016	Humerus/L s/a				1
ACT	Patella/L	1			
AEI	Skull		1		

A male skull with a blunt force trauma wound on the right pariatel bone was found in [AEI]. The edges were rounded and smooth and appeared well healed. This was interpreted as a Pond fracture

Context	Element	Pathology	
		Arthritis	Trauma
		OA	Midshaft fracture
IY	Trapezium/L	1	

VZ	Femur/R		1

PHASE 3B

Context	Element	Pathology
		Arthritis
		SN
1032	Lumbar vert x2	1

PHASE 3-4

Context	Element	Pathology						
		Non-metric Traits			Congenital	Infection	Unknown	
		Metopism	Supraorbital Suture	Infraorbital foramen	Occipital Bun	NSI	Extra facets	Angulation ?rickets
(1191)	Skull	1	1					
	Skull		1	1	1			
	Frontal	1						
	Rib/Lx3						1	1
	Rib/Rx2							1
	Tibia/R					1		

Three left ribs were recovered that had extra facets on the shaft located at the angle. Two of the ribs were anatomically adjacent to each other. They revealed narrowing of the intercostal space and where contact was made three small facets had developed on the inferior border of the upper rib and superior of the lower rib. The third rib also contained these extra facets. The cause of these extra facets is unknown although an individual was recovered (sk 294) that had vertebral scoliosis which had resulted in narrowing between each rib with the contact points developing similar extra facets.

Two right ribs were also recovered that were abnormally curved at the angles. This had resulted in both rib shafts becoming flattened and not as curved as most ribs. There were no signs of infection on either rib. The cause of this flattening was unknown however vitamin D deficiency can cause rib flattening at the shaft as can osteomalacia and in severe cases the ribs can show an inward bend on the lateral side due to the pressure of the arms. Only one of these ribs had evidence of a slight inward bend just distal to the angle. Further causes of rib abnormalities include occupational stresses, disease and external compression (i.e. restrictive clothing) (Groves et al, 2003). Unfortunately due to there being only 2 ribs and no other skeletal elements it is difficult to diagnose with any certainty the cause of these rib abnormalities and the cause therefore remains unknown.

PHASE 4

Context	Element	Pathology		
		Arthritis		Non-metric Trait
		SJD/OP	SN	Occipital Bun
1306	Thoracic vert	1	1	

(1384)	Occipital			1
1502	Cervical vertsx2	1		

PHASE 4A

Context	Element	Pathology			
		Arthritis	Congenital		Infection
		SJD/OP	Fused intermediate and distal foot phalange	Occipital Bun	NSI
107	Thoracic vert x2	1			
	Thoracic vert (T9)	1			
682	Int and Distal foot phalanges		1		
	Skull			1	
	Tibia/L				1

Context	Element	Pathology				
		Arthritis	Trauma	Non-metric Traits		Infection
		SJD/OP	Mid-shaft fracture	3rd trochanter	Lambdoid ossicle	NSI
723	Femur/L x2			1		
	Skull s/a				1	
	Tibia/L					1
808	Radius/R		1			
816	Femur/R			1		
840	Patella/L	1				
1075	Cervical vert	1				

Context	Element	Pathology							
		Trauma	Non-metric Traits				Congenital	Infection	Circulatory
		Osgood-Schlatters Disease	Asterionic Bones	Metopism	Lambdoid ossicle	3rd trochanter	Occipital Bun	NSI	Osteochon-drosis
1082	Skull		1				1		
1142	Frontal/R							1	
1147	Skull				1	1			
1151	Tibia/R s/a	?1							?1
	Femur/L							1	

The proximal end of a right tibia was recovered that had two separate pathological lesions. The first was located at the site of the tibial tuberosity which was completely absent. At its site there was a roughly oval shaped depression that had fairly smooth sides with slight porosity at the distal end. The cause of this was unknown but a traumatic injury resulting in the complete avulsion of the tuberosity was considered. A further lesion was found on the lateral proximal epicondyle. It was oval shaped with sides that tapered inwards to a rough V-shape. The sides were irregular and slightly porotic in appearance. Diagnosis was rather more difficult. Its appearance was suggestive of osteochondrosis disseacans although according to Aufderheide (1998) it is uncommon in this location. The tibia also appeared to be abnormally flattened on the posterior side and the proximal shaft showed some bending in a lateral direction. Unfortunately only the proximal end was available for analysis, the rest of the bone had been lost post mortem. According to Sandritter et al (in Aufderheide et al 1998, 85) there are a few cases of Osgood-Schlatters disease that occurs with late rickets. Therefore, this could account for the abnormal curvature of the tibia and the absence of the tibial tuberosity, but this is only speculative. A very tentative diagnosis of Osteochonodrosis was given to the tibial plateau defect.

Context	**Element**	**Pathology**				
		Arthritis			Metabolic	Infection
		OA	SJD/OP	DJD/OP	CO	NSI
1172	Talus/R	1				
1192	Femur/R	1				
	Clavicle/R			1		
	Cervical vert	1				
	Cervical vert (C7)	1	1			
	Thoracic vert (T9)	1				
	Thoracic vert (T11)		1			
	Thoracic vert		1			
	Lumbar vert (L3)		1			
	Lumbar vert (L4)		1			
	Pars Squama s/a					1
	Tibia/L (foetus)					1
1305	Frontal/L s/a				1	

Context	**Element**	**Pathology**					
		Arthritis			Trauma	Metabolic	Infection
		OA	SJD/OP	DJD/OP	Entheso-pathy	CO	Max Sinus
1324	Lumbar vert (L2)		1				
1339	Maxilla/R s/a						1
	Frontal/L s/a x2					1	
	Patella/L				1		
	Rib/R		1		1		

1373	Lumbar vert		1				
1371	Fibula/R				1		
1376	Fibula/R				1		
1444	Thoracic vert x3	1	1				
	Lumbar vert		1				

Context	Element	Pathology							
		Arthritis			Non-metric Traits		Congenital	Infection	Unknown
		OA	SJD/ OP	SN	Asterionic bones	3rd trochanter	Sacrali-zation of L5	NSI	
1458	Thoracic vert	1							
	Cervical vert	1							
	Skull				1				
1506	Sacrum						?1		
1526	Femur/R							1	
1621	Femur/L					1			
1623	Radius/R								1
1759	Femur/L					1			
1800	Thoracic vert			1					
1803	Femur/R					1			

Context	Element	Pathology				
		Arthritis		Trauma	Non-metric Traits	
		SJD/OP	SN	Spondylolysis	Metopism	3rd trochanter
1846	Lumber vert (L5)			1		
1912	Lumbar vert x2	1				
	Skull				1	
	Femur/R x2					1
2017	Thoracic vert		1			
	Lumbar vert (L1)		1			
2703	Thoracic vert		1			
	Femur/L					1

PHASE ?4A

Context	Element	Pathology				
		Arthritis	Non-metric Traits	Congenital	Metabolic	?Circulatory
		SJD/OP	Mandibular Tori	Occipital Bun	CO	Perthes Disease
749	Frontal/L s/a			1	1	
	Skull s/a			1		
1418	Thoracic vert	1				
1701	Mandible/L		1			
1797	Femur/R					?1
	Innominate/R					?1

The proximal end of a fused femur was recovered in which the superior and anterior area of the head was flattened and had marked widening throughout. Coxa vara was not evident. The head margin was very irregular with the surface porotic with areas of sclerotic hardening. It also appeared mushroom shaped. A possible diagnosis of Perthes disease was given despite there being no coxa vara evident. A slipped epiphyses was also considered although this was thought unlikely as no slippage of the femoral head was evident. A fragment of right ilium was also recovered from this context which had severe flattening and porosity in the acetabulum. The margins were also irregular, although there was post mortem damage at the anterior surface. A possible diagnosis of Perthes disease of the hip joint was given although this is very tentative. Degenerative joint disease could be another cause.

Context	Element	Pathology
		Unknown
		?Pagets/Fibrous Dysplasia
2014	Pariatel	?1

Two small fragments of pariatel bone with prominent meningeal grooves on the endocranial surface were recovered. They were abnormally thickened in cross-section with the diploe appearing porotic and thicker in some sectons. A possible diagnosis of Pagets disease was given although a differential diagnosis could be fibrous dysplasia. Obviously without the rest of the individual for analysis, these diagnoses are merely speculative.

PHASE 4B

Context	Element	Pathology										
		Arthritis				Trauma		Non-metric Traits	Metabolic		Infection	
		OA	SJD/OP	DJD/OP	SN		Wedge	Mandibular Tori	CO	Rickets	NSI	Periostitis
103	Lumbar vert (L4)		1		1							
	Lumbar vert (L4)		1				1					
	Lumbar vert (L5)		1				1					
	Lumbar vert (L5)		1				1					
	Lumbar vert (L5)		1		1							
	Lumber vert (L3)				1							
	Lumber vert (L3)		1									
	Lumbar vert	1										
	Metatarsal (MT3)/R	1										
	Temporal/L										1	
	Femur s/a										1	
	Tibia/L											1
	Humerus/R			1								
	Thoracic vert (T8)		1									
	Thoracic vert (T2)		1				?1					
	Thoracic vert (T4)		1									
	Thoracic vert x7		1									
	Thoracic vert (T10)	1										
	Cervical vert (C4)	1										
	Cervical vert		1									
	Cervical vert x3	1										
	Femur/L			1								
	Mandible							1				
	Frontal/R s/a								1			

Context	Element	Pathology			
		Arthritis			Trauma
		OA	SJD/OP	SN	Prox shaft fracture of fibula with soft tissue ossification
121	Lumbar vert (L4)		1		
	Lumbar vert (L5)			1	
128	Thoracic vert	1			
	Thoracic vert (T12)			1	
	Tibia+Fibula/L				1
	Femur/R		1		

A fused left fibula and tibia was recovered from (128). The fusion was located at the distal tibia/fibula articulation and had a mature cortical bone appearance. The fusion was probable the result of a fracture at the proximal third of the fibula shaft which appeared well healed.

Context	Element	Pathology				
		Arthritis				Non-metric Traits
		OA	SJD/OP	DJD/OP	SN	Mandibular Tori
130	Lumbar vert (L5)		1			
	Thoracic vert				1	
	Thoracic vert (T1)		1			
	Cervical vert (C7)	1				
	Cervical vert		1			
	Cervical vert (C4)	1				
	Cervical vert x3	1				
	Cervical vert (C1)		1			
	Rib/L			1		
	Metatarsal (MT1)/L	1				
318	Prox 1st hand phalange	1				
321	Cervical vert (C2)	1				
	Thoracic vert		1			
	Lumbar vert (L4)	1				
624	Mandible					1

Context	Element	Pathology						
		Arthritis	Trauma	Non-metric Traits		Congenital	Metabolic	
		OA	Fracture	Inca Bone	lambdoid Ossicle	Occipital Bun	CO	?Rickets/ OMAL
630	Prox hand phalange	1						
	Fibula/R		1					

	Skull			1	1	1		
	Frontal/R s/a						1	
	Femur/R							?1
	Tibia/L							?1

Context	Element	Pathology					
		Trauma	Non-metric Traits	Congenital		Metabolic	Unknown
		Midshaft fracture	Mandibular Tori	Occipital Bun	?SBO	Rickets/ OMAL	Osteochondritis diissecans
642	Sacrum				1		
636	Rib/L	1					
668	Mandible		1				
	Rib					?1	
	Occipital s/a			1			
	Humerus/L+R						1

A right rib was recovered that had prominent flairing at its distal end, although no further pathology was observable.

A left and right fully fused humerus were recovered that had round, slightly depressed lesion with a slightly porotic surface on both capitulum articular surfaces. It is thought to be a possible case of Osteochondritis dissecans. Panners disease was another consideration, however, this usually affects male children and resolves spontaneously (Aufderheide and Rodreguez 1998).

Context	Element	Pathology							
		Arthritis			Trauma		Non-metric Traits	Congenital	Infection
		OA	SJD/ OP	SN	Distal shaft fracture	Enthes-opathy	Infra-orbital foramen	Fusion of Fibula+Tibia	NSI
669	Thoracic vert (T10)								
	Fibula/L				1				
	Skull						1		
	Thoracic vert (T10)		1	1					
	Thoracic vert (T10)		1						
	Thoracic vert		1						
	Ulna/R								1
	Clavicle/R					1			
	Humerus/R	1							
680	Fibula+Tibia/R							?1	

A fused right tibia and fibula was located in this context. The fusion was at the proximal end at the tibia-fibula articulation and is characterized by mature cortical bone. There are no signs

of infection, trauma or arthritic changes on either bone and it is thought that the fusion could be congenital.

Context	Element	Pathology				
		Arthritis	Trauma		Metabolic	Unknown
		DSD	Shaft fracture	Distal fracture	CO	Lytic lesion
691	Thoracic vert	1				
	Rib/R		1			
	Radius/L			1		
	Frontal/L s/a				1	
	Clavicle/R					1

A left fully fused clavicle was found to have diffuse pitting on its lateral end along with three lytic lesions. Diagnosis was difficult, however, TB, arthritis and even trauma were all considered as possible reasons.

Context	Element	Pathology			
		Non-metric Traits	Congenital	Congenital	Infection
		3rd trochanter	Sacralization of L5	Fusion of 1st+2nd rib	NSI
(693)	Femur/R	2			
	Sacrum		1		
694	1st+2nd rib			1	
	Fibula/L				1

Two left ribs that were probably congenitally fused at the head were found in this context.

Context	Pathology													
706	Arthritis				Trauma				Non-metric Traits			Congenital		Metabolic
Element	OA	SJD/OP	SN	Erosive Arthropathy	Avulsion of Tibial Tuberosity (Osgood-Schlatters Dis)	Distal shaft fracture	Shaft fracture	Medial fracture	Metopism	Apical Bone	Lambdoid Suture	Sacraliz-ation of L5	Occipital Bun	Rickets/ OMAL
Lumbar vert			1											
Thoracic vert		1												
Thoracic vert (T12)		1	1											
Sacrum x2												?1		
Prox foot phalange	1													
Skull									1	1	1		1	
Skull													1	
Metacarpal (MC1)/R	1													
Metatarsal (MT1)/L				?1										
Fused thoracic vertsx2		1												
Femur/L														?1
Ulna/L						1								
Rib/L							1							
Rib/R x4							1							
Clavicle/R								1						
Tibia/L					1									

A left 1st metatarsal was recovered that had lytic destruction on the dorsal surface at the grooves for the sesamoid bones. This destruction had destroyed the underlying trabeculae and was round in shape with an average diameter of 3.4 mm. No martel hook was present to indicate gout and a very tentative diagnosos of an Erosive Arthropathy was given.

Context	Element	Pathology				
		Arthritis	Trauma		Non-metric Traits	Congenital
		SJD/OP	Midshaft fracture	Distal shaft fracture	Metopism	Occipital Bun
724	Fused thoracic vertsx2	1				
	Thoracic vert	1				
	Radius/R			1		
	Clavicle/R s/a		1			
	Skull				1	1

A right clavicle from an infant was recovered from the above context which had a midshaft fracture that had resulted in slight misalignment and rotation at the lateral end. The length of the clavicle suggests that this individual was 0-6 months of age (Scheur and Black 1996)

Context	Element	Pathology						
		Arthritis			Trauma	Non-metric Traits		Congenital
		OA	SJD/OP	SN	Midshaft fracture	3rd trochanter	Metopism	SBA
730	Humerus/L				1			
	Frontal						1	
	Innominate/R	1						
737	Lumbar vert		1					
738	Lumbar vert			1				
	Cervical vert (C1)							1
	Skull						1	
756	Cervical vert (C4)	1						
762	Femur/R					1		

Pathology															
uma	Non-metric Traits					Congenital		Metabolic			Infection		DISH/AS	Unknown	
Medial end fracture	Meto-pism	Mental Foramen	Infraorbital Suture	Infraorbital Foramen	Zygomatic foramen	SBO	Occipital Bun	CO	Rickets	OPOR	Max Sinus	Osteo-myelitis	AS	?Erosive changes ?arthropathy	Angulated Rib
													?1		
						?3									
							1								
		1													
	1														
									?1						
								1							
										?1					
			1	1	1										
1															
														?1	
														?1	
											1				
												?1			
												1			
															1

A left ulna was recovered which had severe erosive changes to the olecranon process. Its whole surface was affected with erosion and porosity. Porosity also affected the right lateral surface of the trochlear notch and on both sides adjacent to the notch. These had evidence of remodelling. A diagnosis of a possible erosive arthropathy was given.

A further left ulna was found in this context with very slight erosion and porosity on its distal articular surface. No trauma was noted or degenerative changes. A possible erosive arthropthy was again diagnosed.

A fully fused right radius was recovered that contained pitting and small sinus lesions along the distal third of the shaft. The bone surface also showed reactive bone healing presenting as bone thickening with an irregular surface topography. A diagnosis of probable Osteomyelitis was given. No fracture was evident to suggest that the infective agents entry was via this route.

A left radius was also recovered which had a grossly thickened midshaft and distal end. This thickening was characterized by fairly irregular but smooth remodelled bone which contained porosity and lamellar bone. There were also several areas of woven bone. On the distal third of the shaft there were five sinuses which had practically coalesced with each other to expose the underlying medullary cavity. The radius also has a slight bend in the midshaft area and it is possible that this is an old fracture site. If this is correct, then the probable osteomylitic infection could be secondary to a fracture.

Two left ribs were recovered that were abnormally curved. After the angle both ribs were very straight instead of curving with the sides orientated medial-lateral instead of superior-inferior. No obvious fracture was evident to suggest an obvious cause for this angulation, although congenital or even strapping for medical reasons or dress are potential causes.

Context	Element	Pathology				
		Arthritis			Non-metric Traits	Unknown
		OA	SJD/OP	SN	Maxillary Tori	?AS
784	Skull				1	
793-801	Cervical vert		1			
799	Cervical vert		1			
	Cervical vert	1				
	Lumbar vert (L3)		1	1		
	Patella			1		
	Calcaneus/R			1		
	Fused thoracic vertsx3					?1

Three thoracic vertebrae were located that were fused at the bodies. The fusion was a result of hypertrophic bone formation within the intervertebral space. There was also a slight scoliosis in a left lateral direction which had resulted in the fusion of the left articular facets, although the right remained unfused. The fusion is typical of AS although due to the partial nature of the elements it is difficult to suggest this with any certainty. There were no obvious signs of spinal joint disease such as osteophyte formation.

Context	Element	Pathology	
		Arthritis	Unknown

		OA	Fused verts
804	Metatarsal (MT1)/R	1	
	Fused cervical C2+3)		1

A 2nd and 3rd fused vertebrae were recovered from this context. The vertebrae were fused at the articular facets and spinous processes, although the space between the bodies had been maintained. There does not appear to be any evidence of spinal joint disease. The cause of this fusion was unknown although Klippel-feld syndrome was considered.

Context	**Element**	**Pathology**						
		Arthritis			Non-metric Traits		Congenital	Infection
		SJD/OP	DJD/OP	SN	3rd trochanter	Mandibular Tori	Sacralization of L5	NSI
806	Thoracic vert s/a			1				
	Sacrum						?1	
812	Thoracic vert (T12)	1						
814	Femur/R				1			
	Tibia/R							1
823	Fused thoracic vert T11+12	?1						
	Thoracic vert	1						
	Mandible					1		
827	Metacarpal (MC2)		1					

Context	**Element**	**Pathology**								
		Arthritis			Trauma		Congenital		Metabolic	Infection
		OA	SJD/OP	SN	?fracture	Partial avulsion of tibial tuberosity	Occipital Bun	Sacralization of L5	Rickets	NSI
830	Cervical vert (C2)	1								
831	Metatarsal (MT5)/L				1					
832	Femur/R s/a								1	
	Sacrum							1		
835	Thoracic vert			1						
837	Tibia/R					1				1
841	Thoracic vert		1							

	Thoracic vert (T7)	1								
	Skull						1			

Context	Element	Pathology						
		Arthritis				Unknown		
		OA	SJD/OP	DJD/OP	SN	?klipper-feld syndrome	?Trauma/Infection	?Trauma/ Metabolic deficiency
842	Int hand phalange	1						
	Trapezium/R	1						
	Thoracic vert	1						
843	Lumbar vert	1						
	Lumbar vert (L3)		1		1			
	Thoracic vert (T11)		1		1			
	Thoracic vert		1		1			
	Thoracic vert		1					
	Scapula/R			1				
	Fused thoracic verts (T10+11)		1					
	Fused cervical verts (C2+3)					?1		
	Prox hand phalange						1	
	Sacrum							1

A further 2nd and 3rd fused cervical vertebrae was recovered from phase 4B. The fusion appeared very longstanding and not as a result of any degenerative changes. The fusion is similar to that of Klippel-feld syndrome although this can only be a very tentative diagnosis due to no other associated body elements being available for analysis and also the lack of fusion at the vertebral bodies. The bone changes merely allude to this above disease and are not diagnostic of it.

A proximal hand phalange was also recovered that had a normal proximal end with slight post mortem damage. However, the distal end was not present, the shaft tapered to a point with a rounded end at the distal third of the shaft. There was also a slight lateral deviation in the midshaft area. No obvious fracture could be discerned but the midshaft angulation could suggest this. The tapered distal end could be suggestive of non-union of two ends of a fracture, however this is speculation. There is no obvious arthritic change or active infection. A further consideration is leprosy. In the hands reabsorption begins at the distal phalanges and progresses in a proximal direction. According to Ubelaker (19--) the cortex of these reabsorbed bones remains complete with tapered points and with no evidence of arthritic changes. This is similar to the bone that is present here although leprosy cannot be used as a definitive diagnosis. Cupping deformities can also occur at the joints in leprosy which is not present here.

A fully fused sacrum was present that did not have an obvious sacral curve. The anterior side of the sacrum was straight with the body of S1 sloping downwards in an anterior-posterior direction. This type of straightness was noted in skeleton (sk 217) that had osteoporosis and rickets/osteomalacia. Although this sacrum did not appear particularly light to touch which

could discount osteoporosis, osteomalacia can result in pelvic abnormalities in adults. Obviously due to no other skeletal element being present this cannot be used as a diagnosis.

Context	Element	Pathology		
		Arthritis		
		SJD/OP	DJD/OP	Erosive Arthropathy
844	Metacarpal (MC1)		1	
	Femur/R		1	
846	Lumbar vert	1		
	Metatarsal (MT1)			?1

An erosive lesion was located on the right lateral surface at the margin of the head of a 1st left metatarsal. Several other small lesions were located on the plantar surface at the margin of the head and a further lesion on the articular surface of the head. No healing was evident. Several diagnoses were considered, including gout although no martel hook was evident to conclusively diagnose. Infection was also considered as was arthritis. It was best at present to attribute the cause as an erosive arthropathy.

Context	Element	Pathology					
		Arthritis			Non-metric Traits	Infection	
		OA	DJD/OP	SN	Metopism	NSI	Osteomyelitis
849	Lumbar vert			1			
	Thoracic vert			1			
	Thoracic vert (C7)	1					
	Scapula/R	1					
	Sternum		1				
	Femur/L						1
	Tibia/L					1	

A left femur with gross thickening in the middle and distal end of the shaft was located in the above context. The surface of the bone was slightly roughened with small areas of lamellar bone and porosity. It also contained areas of hypervascularity. Bone remodelling and destruction was also evident on the lateral epicondylar surface where there was also a small sinus. A possible diagnosis of osteomyelitis was given.

Context	Element	Pathology					
		Arthritis		Trauma	Non-metric Traits	Infection	
		SJD/OP	DJD/OP	Distal fracture	Maxillary Tori	NSI	Max Sinus
850	Lumbar vert (L4)	1					
	Radius/R		1				
	Maxilla (L+R)				1		1
	Fibula/R			1		1	
851	Lumbar vert (L3)	1					

Context	Element	Pathology						
		Arthritis	Trauma	Non-metric Traits			Metabolic	
		SJD/OP	SFT	Apical Bone	Asterionic	Mandibular Tori	Rickets	CO
853	Lumbar vert (L3)	1						
	Femur/R		1					
	Tibia/L						?1	
	Mandible					1		
	Skull			1	1			
	Frontal n/a							1

Context	Element	Pathology	
		Arthritis	Infection
		OA	NSI
859	Cervical vert	1	
	Tibia/L s/a		1
	Tibia/R s/a		1

Context	Element	Pathology							
		Arthritis	Trauma		Non-metric Traits		Congenital	Infection	DISH/AS
		SN	Wedge fracture	Distal shaft fracture	Apical Bone	Lambdoid Sutures	Occipital Bun	Osteitis/ Osteomyleilitis/ Gummatous	
870	Thoracic vert	1							
	Lumbar vert	1							
	Lumbar vert		1						
	Skull				1	1			
	Skull						1		
	Radius/R			?1					
	Fused R+L Innominate and Sacral bones								?1
	Tibia/R							?1	

A grossly thickened right tibia was found which contained gummatous and non-gummatous periostitis and osteitis on all surfaces of the midshaft and distal areas. The shaft was thickened due to continual remodelling with lamellar bone evident on several sides along with several areas of sclerotic, plaque like bone on the lateral side. The gummatous lesions which were found on the anterior and medial sides were very irregularly shaped with sharp sides which had perforated the cortical bone to expose the underlying thickened bone. Despite this the medullary cavity had not been exposed. Both the distal and proximal articular surfaces were normal as was the tibial tuberosity. A diagnosis of an infective process was given, although the origin of the infection is unknown. Sclerosing Osteomylitis with the gummatous lesions having a soft tissue origin was considered as was a treponemal infection.

Also located were right and left innominate bones which were fused to the sacrum, although they had since become detatched due to post mortem damage. Small bony bridge formations were present on both innominate bones which would have fused them to the sacrum. There was also bone formation on the ischial tuberosities and iliac crests. There was also a small, bony bridge at the posterior side of the pubic symphses which would have fused them

together, although the surface of the pubic sypmphses appeared relatively intact. A possible diagnosis of DISH was given although AS is also another consideration.

Context	Element	Pathology						
		Arthritis				Non-metric Traits	Metabolic	Infection
		OA	SJD/OP	DJD/OP	SN	Acc Artic Facets	Rickets/ OMAL	NSI
871	Thoracic vert				1			
872	Lumbar vert				1			
875	Lumbar vert				1			
	Scapula					1		
	Femur/L							1
	Tibia/L							1
881	Tibia/L						?1	
883	Cervical vert	1						
	Lumbar vert		1					
	Lumbar vert				1			
885	Thoracic vert		1					
	Thoracic vert (T12)		1					
	Distal foot phalange			1				
	Metatarsal (MT1)			1				
	Frontal s/a							1
887	Cervical vert				1			
	Cervical vert				1			

Context	Element	Pathology						
		Arthritis				Congenital	Metabolic	Infection
		OA	SJD/OP	SN	Erosive Arthropathy	Fused phalanges	Rickets/ OMAL	NSI
888	Int + distal foot phalanges					1		
	Metacarpal (MC1)/R	1						
889	Thoracic vert		1					
	Ulna/L							1
892	Tibia/L						?1	
894	Metatarsal (MT1)				1			
	Lumbar vert			1				

A 1st left metatarsal was located that had severe erosion on all surfaces of the head, particularly the medial side. The articular surface had been completely destroyed and contained a scooped out lytic lesion. There were also several areas of remodelled, sclerotic bone on the lateral dorsal and medial plantar sides. A possible diagnosis of gout or an erosive arthropathy was given.

Context	Pathology															
902	Arthritis				Trauma				Non-metric Traits	Congenital		Metabolic		Infection		Tumour
Element	OA	SJD/OP	DJD/OP	SN	Proximal shaft fracture	Shaft fracture	Lateral enthes-opathy	SFT	Metopism	Occipital Bun	SBO	CO	Rickets	NSI	Max Sinus	Osteod Ostemoa
Thoracic vert x2		1														
Thoracic vert	1															
Cervical vert x2	1															
Lumbar vert	1															
Lumbar vert (L4)		1														
Fused thoracic vertsx2		1														
Fused thoracic vertsx2		1														
Fused thoracic vertsx2		1														
Fused thoracic vertsx3		1														
Fibula/L					1											
Rib						1										
Clavicle/L							1									
Femur/L s/a													?1			
Frontal/R s/a												1				
Skull										1						
Skull x2									1							
Skull - Sinus/R															1	
- Frontal/L								1								
Capitate/R	1															
Metacarpal (MC3)/R	1															

Metacarpal (MC1)/R	1															
Patella/L	1															
Radius/L	1															
Fibulala/L														1		
Sacrum												1				
Femur/L																1
Humerus/R														1		

A left fully fused femur with a probable osteoid osteoma on the medial midshaft was found in (902).

A probable male skull was also recovered from the above context. The right sinus had severe maxillary sinusitis, the left was fragmentary and observation impossible. It also contained a sharp force trauma wound probably the result of a projectile weapon on the left frontal boss. It was roughly square in shape and had clean, sharp edges with no healing evident. There was also a further two radiating wounds on the frontal bone.

The distal end of a right humerus was also found that had marked lytic destruction on its posterior side along with bone thickening and repair on its anterior surface. The bone destruction was very irregularly shaped and had completely removed the cortical bone. The distal articular surface appeared normal and the medullary cavity did not appear to be affected. The diagnosis was of a probable non-specific infection which was active at the time of death. The infection did not have the appearance of osteomylitis or TB. However, it was more reminiscent of a treponemal disease such as tertiary syphilis. The diagnosis is essentially unknown and has been categorized at present as a non-specific infection.

Four sets of fused thoracic vertebrae were also recovered. This fusion was characterized by smooth bony bridges on the right antero-lateral side of the bodies. Unfortunately due to there not being 4 consecutively fused vertebrae, DISH could not be diagnosed and a possible diagnosis of SJD/OP was given.

Context	**Element**	**Pathology**						
		Arthritis		Non-metric Trait	Congenital	Metabolic	Infection	Unknown
		OA	SN	3rd trochanter	Occipital Bun	CO	NSI	?Infection/ Malignancy
903	Cervical vert x2	1						
	Thoracic vert (T10)	1						
	Skull				1			
904	Lumbar vert (L3)		1					
	Skull				1			
912	Tibia						1	
934	Frontal n/a					1		
938	Femur/L			1				
	Sacrum							1

A fully fused sacrum with widespread bone destruction on the anterior surface which included at least two lytic lesions was found in the above context. These lytic lesions were surrounded by small porous lesions on the anterior surface and were located on S2-S4 sacral segments. The lesions were surrounded by widespread porosity on all the sacral bodies, with the wings relatively free of pathology. The porotic areas were smooth and had the appearance of remodelled bone. The sacrum was also very angulated although there did not appear to be any body collapse. Diagnosis was of a possible infection or lytic malignancy.

Context	Element	Pathology				
942		Arthritis	Non-metric Trait		Congenital	Infection
		OA	Apical Bones	Lambdoid Ossicles	Occipital Bun	Osteomyelitis
	Skull		1		1	
	Skull					1
943	Cervical vert (C7)	1				
	Metatarsal (MT2)	1				
944	Tibia/R			1	1	

The above right tibia had quite severe thickening on its entire surface particularly the distal half of the bone where the thickening was most severe. In this area the surface was characterized by a thickened, irregular surface with lamellar and woven bone and intermittent areas of porosity. There were also two sinuses on the anterior surface that had perforated the underlying tissue. There was no tracking between either of these sinuses. A further sinus was found at the distal end of the shaft on the lateral surface adjacent to the auricular surface, this perforates the trabecular bone. A probable diagnosis of osteomyelitis was given to the infective pathology.

Context	Element	Pathology				
		Arthritis	Tumour	Congenital	Metabolic	Infection
		OA	Osteochondroma	Occipital Bun	Rickets	NSI
948	Thoracic vert	1				
	Femur/L		?1			
	Skull			3		
	Fibula/L				?1	
	Femur/R				?1	
	Tibia/L					1

The lateral midshaft of a left fully fused femur had clearly demarcated raised oval shaped lesion on its surface. The lesion was covered with cortical bone and had a small area of porosity. Some of the cortical bone had flaked off exposing a tight knit trabecular bone beneath which appeared continuous with the trabecular bone of the shaft. The diagnosis of a possible benign neoplastic lesion was considered, focusing on a possible osteochondroma as a cause.

Context	Element	Pathology				
		Arthritis	Non-metric Trait	Congenital	Trauma	Infection
		SN	Mandibular tori	Occipital Bun	Shaft fracture	NSI
952	Lumbar vert	1				
960	Mandible		1			
975	Rib				1	1
	Occipital			1		

Context	Element	Pathology

		Arthritis		Trauma		Non-matric Traits	Metabolic
		OA	DJD/OP	Distal shaft fracture	Midshaft fracture	Sternal Foramen	CO
1004	Tibia/L			1			
1010	Patella/R	1					
	Thoracic vert	1					
	Innominate/R		1				
	Innominate/R		1				
	Frontal/L s/a						1
	Sternum					1	
	Femur/R s/a				1		

A sub-adult right femur was recovered from the above context. Measurement of the shaft suggested that the individual was a child between 4 - 6 years old (Maresh 1970). Located at the midshaft was a probable oblique fracture which was well aligned and repaired.

Context	Element	Pathology		
		Congenital	Metabolic	Infection
		Fused phalanges	Rickets/OMAL	Max Sinus
1028	Maxilla/R+L			1
1029	Fused int+distal foot phalange	1		
1045	Fused int+distal foot phalange	1		
1053	Tibia/L s/a		?1	

A sub-adult tibia was recovered that had an obvious bend to the distal and medial areas of the shaft. There was slight porosity at both ends of the bone although no obvious flairing. A very tentative diagnosis of possible rickets was given.

Context	Element	Pathology	
		Arthritis	Unknown
		SJD/OP	Lytic lesion/Infection
1054	Thoracic vert	1	
1060	Lumbar vert		1

A lytic lesion in the central area of the superior body was found on a lumbar vertebrae. The side of the lesion were irregular and sharp with the underlying trabeculae exposed. Diagnosis was problematic however, disc herniation, and even infection was considered although this was thought more unlikely.

Context	Element	Pathology	
		Metabolic	Infection
		Rickets/OMAL	Periostitis
1071	Femur/R s/a	1	1

	Tibia/R s/a	1	1

The shaft of a non-adult femur was recovered with an obvious anterior kyphosis. There was also slight flairing at the distal end although this was difficult to discern with confidence due to post mortem damage at the ends of the bone. Grey woven bone was also found on the posterior area of the shaft and covered its full length. A possible diagnosis of rickets with a periostitic infection was considered.

A sub-adult tibia was also located with an obvious kyphosis of the shaft. Grey woven bone was located on the posterior of the shaft. No flairing was noted at the epiphyseal ends. Again rickets and periostitis was considered as a possible cause.

Context	Element	Pathology					
		Arthritis		Non-adult Traits		Metabolic	
		SJD/OP	DJD/OP	?Erosive Arthropathy	Infraorbital foramen	CO	Rickets/ OMAL
(1072)	Navicular		1				
	Frontal s/a					1	
1079	Lumbar vert (L5)	1					
	Thoracic vert	1					
	Cervical vert			?1			
	Skull				1		
	Femur/R						1

Context	Element	Pathology				
		Arthritis		Trauma		Metabolic
		OA	SJD/OP	Distal third shaft	Wedge fracture	Rickets
1092	Scaphoid/R	1				
	Thoracic vert				1	
1120	Cervical vert		1			
	Innominate/R pubis	1				
	Ulna/L			1		
	Tibia/R					?1

A fully fused tibia with slight lateral bowing in the mid and distal third of the shaft was recovered from the above context. There was also a slight kyphosis in the midshaft area. The tibia was very gracile and flattened in the medial-lateral direction. Both the distal and proximal ends appeared normal. The platycnemic index for this bone = 55.3 (Bass 1995). A possible cause of rickets could suggest the abnormal curvature in this bone. However, the medial-lateral flattening was more difficult. Saber shins was considered although there was not the thickened periostitis on the anterior surface which is a characteristic of syphilitic saber shins. At present the cause remains unknown.

A right pubic symphysis with severe osteoarthritic changes on its pubic surface was also found in the above context. Eburnation and osteophtes were present, including porosity. Unfortunately due to its fragmentary state it was unknown if it was from a male or female individual.

Context	Element	Pathology

		Arthritis		Congenital	Metabolic	Infection	DISH/AS
		SJD/OP	SN	Occipital Bun	Rickets	NSI	DISH
1123	Thoracic vert	1					
	Tibia/R					1	
11XX	Skull			1			
1135	Thoracic vert	1					
	Femur/L s/a				1		
1140	Cervical vert	1					
	Fused thoracic vertsx8		1				1

Eight fused thoracic vertebrae were located in the above context with the fusion characterized by thick, smooth bony bridges on the right antero-lateral side of the bodies. The fusion was note see on the left side except at T3-T4 where there was a similar thick bony bridge. The vertebral body space had been maintained and the articular facets had not been fused. There was also a schmorls node on the inferior body of the lowest fused vertebrae (T10). The cause of this fusion was probably DISH with schmorls node present.

Context	**Element**	**Pathology**				
		Arthritis	Trauma	Non-metric Traits	Congenital	Age-related
		SJD/OP	Shaft fracture	Metopism	Occipital Bun	Bilateral Ossification
1163	Innominate/R	1				
	Sternum+1st ribs					1
1166	Rib/L		1			
	Occipital s/a				1	
	Skull				1	
	Skull			1		

Context	**Element**	**Pathology**	
		Non-metric Trait	Metabolic
		3rd trochanter	?Rickets/scurvy
1174	Femur/L	1	
1179	Tibia/R s/a		?1
	Humerus/L s/a		?1

The right tibia of a young sub-adult was located which had extreme thinning of the cortical bone and porosity at both ends. The proximal and distal epiphyseal surfaces had been lost post mortem with the trabecular bone very sparse; this sparseness was thought to be due to the disease process rather than post mortem damage. There was no obvious flairing at the distal end although it did appear slightly larger than normal; neither was there any obvious bending of the bone in the shaft area. The periosteum had woven bone on all surfaces. Due to the fragmentary nature diagnosis was difficult. However, infection or a metabolic condition such as rickets or even scurvy was considered but remains essentially unknown at present.

A left sub-adult humerus was also found in this context with similar pathology as the above tibia. Again an infection or a metabolic condition such as rickets or even scurvy, were considered as a potential cause.

Context	Element	Pathology		
		Arthritis	Trauma	Unknown
		OA	Wedge fracture	Fusion/scoliosis/lytic lesion
1184	Fused thoracic vertsx2	1	1	1

Two fused thoracic vertebrae were located in this context. The upper vertebral body had a visible collapse on the left side which had resulted in the fusion of both bodies at this side. The collapse to the left side had resulted in the right side having a larger than usual intervertebral space between both bodies. This had resulted in scoliosis. There were also extensive pathological changes to all the articular facets which had porosity and osteophtye formation. Fusion of the spinous processes was also present as were fusion of the vertebrae at their lower and upper articular facets. There were also lytic lesions on the body surfaces of both vertebrae. These were oval shaped and had exposed the underlying trabeculae. It was probable that several pathological processes were occurring. The collapse of the vertebra was probably due to fracture which had resulted in scoliosis and secondary arthritic changes. The lytic lesions were possibly due to disc herniation, however diagnosis is difficult with very few elements to analyse.

Context	Element	Pathology						
		Arthritis		Trauma	Non-metric Traits			Congenital
		OA	SJD/OP	Shaft fracture	Lambdoid Suture	Mastoid Foramen	Metopism	Sacralization of L5
1192 or 1193	Thoracic vert		1					
	Radius/L	1						
	Sacrum							1
	Rib/L			1				
	Skull						1	
	Skull				1			
	Skull					1		

Context	Element	Pathology			
		Arthritis		Non-metric Traits	
		OA	SJD/OP	Metopism	Acc artic facet
1193	Cervical vert (C2)	1			
	Cervical vert (C7)	1			
	Thoracic vert		1		
	Skull			1	
	Scapula				1

		Pathology			
		Non-metric Traits		Congenital	Infection
		Metopism	Mandibular tori	Occipital Bun	Osteomyelitis
1208	Mandible		1		
	Skull	1			

	Skull			1	
1219	Tibia/L				1
	Radius/R				1

A tibia with possible osteomyelitis was recovered from this context as was a right radius**.** The radius had a large sinus in the proximal middle third of the shaft which had passed through both sides of the bone. The margins of the sinus on both sides were fairly rounded and smooth as was the rest of the bone although there was slight thickness to the proximal half of the bone. The proximal articular surface was also affected with porosity on its surface. A possible diagnosis of osteomyelitis with healing was considered.

Context	**Element**	**Pathology**			
		Arthritis		Trauma	Congenital
		OA	SJD/OP	SFT	Occipital Bun
1241	Thporacic vert (T10) x 2		1		
	Scapula/R	1	1		
	Skull x2				1
	Skull			1	

A predominantly male skull was located in the above context that had a sharp force trauma wound on its left frontal boss. The trauma was well healed and had not affected the underlying diploe.

Context	**Element**	**Pathology**					
		Arthritis		Trauma			
		OA	DJD/OP	Spond-ylolysis	Sternal end fracture	Distal shaft fracture	Body fracture
	Lumbar vert (L5)			1			
	Ulna/R		1				
1244	Clavicle/R	1			1		
	Rib/R						
	Scapula/L						1
	Tibia/L					1	

Context	**Element**	**Pathology**				
		Arthritis		Trauma	Infection	Unknown
		DJD/OP	Septic Arth	Wedge fracture	Osteomyelitis	?Soft tissue lesion/Infection
1245	Innonminate/L	1				
	Thoracic vert (T12)	1		1		
1249	Innominate/R	1				
1250	Humerus/R		?1		?1	
	Femur/R					1

A lytic lesion was present on the distal third of a right femoral shaft. The lesion was oval shaped with irregular and sharp edges. The lesion was surrounded by reactive bone which was slightly raised from the surrounding surface and comprised of new bone formation in the presence of lamellar bone and porosity. The lesion was very localised in nature. Diagnosis was rather difficult, an infective process such as osteomyelitis was discounted; a soft tissue abscess was also considered although with an ulcer the bone reaction is often more bone forming rather than lytic. At present aetiology is unknown

On the midshaft of a right humerus in the same context was on oval shaped sinus with smooth, rounded edges. The sinus had tracked and the medullary cavity had been left exposed. The bone surrounding the sinus was smooth, cortical bone suggesting that the infection was not active at death. A possible tentative diagnosis of osteomyelitis was considered. However, at the distal end of the bone there was an erosive lesion on the capitulum and trochlea surfaces with very slight surrounding porosity. The bone was roughened to touch with the trabecular bone left exposed. A possible cause of septic arthritis was considered secondary to osteomyelitis.

Context	Element	Pathology								
		Arthritis		Trauma		Non-metric Traits	Congenital	Metabolic		Infection
		DJD/ OP	SN	SFT	Traumatic Myositis Ossificans	Maxillary Tori	Occipital Bun	Rickets	CO	NSI
1251	Femur/R	1								
1255	Lumbar vert		1							
	Skull - Maxilla+ zygomatic arch/R			1		1	1			
	Femur/L				1					1
	Femur/L							?1		
	Frontal/R+L s/a								1	

An irregular, projected area of ossified tissue was located on a left femur on the mid to upper distal third area of the posterior shaft and was continuous with the surrounding bone. It was not typical of bone tumours such as osteochondroma and chondrosarcoma and due to its close proximity to muscle attatchment sites it was presumed to be Traumatic myositis ossificans. At the distal third of the shaft there was further pathology with the bone slightly enlarged with porosity and lamellar bone formation. A diagnosis of a non-specific infection was probable.

A predominantly male skull was located that had a linear oblique sharp force trauma wound on the right maxilla at the alveolar process which had detached the bone which had resulted in the removal of the teeth (from right I1 to right M1). No healing was evident and it was presumed that the individual had died before healing could take place,

Context	Element	Pathology				
		Arthritis	Trauma	Non-metric Traits	Congenital	Metabolic
		SJD/OP	Distal shaft fracture	Apical Bone	Occipital Bun	Rickets/ OMAL
1258	Skull				1	

1279	Patella/R	1				
	Ulna/R		1			
	Femur/R					1
	Skull				1	
	Skull			1		
1295	Skull				1	

Context	Element	Pathology					
		Arthritis			Trauma	Non-metric Traits	Unknown
		OA	SJD/OP	DJD/OP	Shaft fracture	Apical Bones	Extra facet
1296	Thoracic vert (T12)		1				
	Thoracic vert		1				
	Metacarpal (MC3)/L	1					
	Femur/L			1			
	Rib/L				1		
	Metatarsal (MT4)/R						1
	Skull					1	

Context	Element	Pathology					
		Arthritis	Trauma		Non-metric Traits	Metabolic	Infection
		SJD/OP	Wedge fracture	SFT	Acc artic facet	Rickets/ OMAL	Max Sinus
1301	Lumbar vert (L4)	1					
1302	Thoracic vert x2	1					
	Lumbar vert (L4)	1	1				
	Scapula/R	1					
	Sacrum (S1)	1					
	Scapula x2				1		
1304	Maxilla s/a						1
1308	Skull			1			
	Femur/L					?1	

A fragmentary male adult cranium was recovered which contained five sharp force trauma wounds on its surface. Three of these were oblique wounds which had detached roundels of bone and two linear wounds that had passed cleanly through the bone. All were located on the pariatel and frontal bones with no bone healing evident.

Context	Element	Pathology			
		Arthritis	Trauma	Non-metric Traits	Infection

		OA	SJD/OP	DJD/OP	SN	Distal Fracture	Lambdoid ossicle	NSI
1332	Rib/L x2			1				
	Rib/R			1				
1340	Ulna/R s/a					?1		1
	Skull						1	
	Lumbar vert		1					
	Lumbar vert		1		1			
	Lumbar vert				1			
	Cervical vert	1						
	Thoracic vert	1						
	Thoracic vert (T12)				1			
	Lumbar vert (L3)				1			
	Lumbar vert				1			
	Lumbar vert				1			
	Lumbar vert		1					

A sub-adult right ulna was recovered from the above context that had abnormal thickening at the head and shaft. The cortical bone was very smooth except on the posterior and lateral surfaces where there were several small lytic lesions. The distal shaft had a slight medial bend although there was no obvious fracture line evident. An infection of unknown origin was considered with a possible distal shaft fracture.

Context	**Element**	**Pathology**			
		Arthritis		Trauma	
		SN	SJD/OP	Distal shaft fracture	Mid-shaft fracture
1348	Lumbar vert	1			
	Lumbar vert (L2)	1			
	Tibia/R			1	
1359	Thoracic vert		1		
	Clavicle/L				1

Context	**Element**	**Pathology**							
		Arthritis		Non-metric Traits				Infection	DISH/AS
		OA	DJD/OP	Apical Bones	Mandibular tori	Infraorbital foramen	Lambdoid Ossicle	NSI	
1361	Cervical vert	1							
	Sacrum+Innominate /R		1						?1
	Fibula/L							1	
	Mandible				1				
	Skull					1	1		
	Skull			1		1			

A sacrum which was fused to the right innominate at the sacroiliac joint was recovered from the above context. The fusion was characterized by very smooth, mature cortical bone. There was also slight enthesopathial bone formation on the iliac crest margin and ischial tuberosity. On the S1 of the sacrum there was also slight osteophyte formation on the margin. A possible

diagnosis of DISH or AS was given but this is tentative only. Degenerative joint disease was also found on the sacrum

Context	Element	Pathology						
		Arthritis	Trauma	Non-metric Trait			Congenital	Unknown
		SJD/OP	Wedge fracture	Palatine torus	Lambdoid ossicle	Metopism	Occipital Bun	?Perthes /AS
1364	Lumbar vert	1						
	Skull			1	1	1		
	Lumbar vert	1	?1					
1387	Skull						1	
1391	Fused Innominate/ L+sacrum							1

A fused left innominate and sacrum from a female individual was recovered from (1391). The fusion was at the sacro-iliac joint where the joint has been completely destroyed and bony ankylosis appeared complete around the margin. No excess bone formation could be observed elsewhere on the innominate or sacrum. The acetabulum had also been affected with the joint margin enlarged and irregular in shape with the cup very shallow with sub-chondral bone remodelling. There is also severe hypertrophic bone formation around the joint margin. On the anterior surface of the ilium there was also an area of bone remodelling and growth. At present its cause is unknown. The cause of the fusion is unknown although it could be AS. The acetabulum could be caused by Perthes or even traumatic hip dislocation. There is an area of flattened bone on the superior area of the acetabulum although there is no secondary acetabulum present. Unfortunately due to the absence of the femoral head it is difficult to make a diagnosis. It must be noted that both AS and Perthes are most common in males, although not exclusively and this pelvis had more female characteristics

Context	Element	Pathology				
		Arthritis		Tumour	Non-metric Traits	Congenital
		OA	DJD/OP	Button Osteoma	Infraorbital foramen	Occipital Bun
1392	Scapula/L	1				
	Cervical vert (C7)	1				
	Thoracic vert (T11)	1				
	Ulna/R		1			
1396	Skull					1
1415	Skull				1	
	Pariatel/L			1		

Context	Element	Pathology						
		Arthritis		Trauma	Congenital	Metabolic		Infection
		OA	SN	Fracture	Occipital Bun	CO	Rickets	NSI
1429	Lumbar vert		1					

1431	Tibia/R							1
1452	Frontal s/a					1		
1460	Skull				1			
1504	Cervical vert	1						
	Thoracic vert		1					
1507	Ulna/R s/a			?1			?1	

A sub-adult bone was recovered that had an abnormally curved shaft that had a slight lateral bend at the proximal end and a corresponding lateral bend at the distal end. The midshaft was very sinuous. The proximal end also appeared slightly enlarged with an extra articulate facet at the radial articulation. There was no flairing or porosity to suggest rickets as a possible cause. The lateral deviation of the head could have been due to trauma which had resulted in the extra radial articular facet due displacement following the traumatic episode.

Context	**Element**	**Pathology**							
		Arthritis		Non-metric Traits			Congenital		Unknown
		SJD/OP	SN	Lambdoid ossicles	3rd trochanter	Distal Septal Aperture	Occipital Bun	Sacraliz-ation of L5	Lytic lesion
1614	Humerus					1			
1615	Skullx2			1			1		
	Sacrum							1	
1619	Lumbar vert	1	1		1				1
	Femur/R				1				

A lumber vertebra in the above context had an irregularly shaped lytic lesion on its superior surface. The cortical bone had been completely eroded as had the underlying trabecular bone to a depth of 10.5mm. The lytic lesion had sclerotic bone around its margin. The body appeared to be slightly depressed in the anterior area which could suggest a fracture. There was also a schmorls node on the inferior body. Diagnosis was difficult. TB was considered as this can cause lytic lesions on vertebral bodies which can lead to cavitation (Ortner 2003) as can brucellosis which again can cause lytic perforation followed by sclerotic repair. Obviously the above conditions are suggestions only and cannot be used as diagnosis due to the lack of definitive evidence.

Context	**Element**	**Pathology**					
		Arthritis		Non-metric Traits		Metabolic	Infection
		OA	SN	Erosive Arthropathy	3rd trochanter	?Osteoporosis	NSI
1630	Cervical vert	1					
	Lumbar vert		1				
	Femur/L						1
1655	Distal hand phalange	1					

(1660)	Metatatarsal (MT3)+3rd cuneiform (CF)/L			1		?1	
	Femur/L				1		

A fused 3rd metatarsal MT3 and 3rd cuneiform tarsal was recovered from the above context. The 3rd CF tarsal had ankylosed to the MT3 at the articular surfaces. This fusion was characterized by small bony bridges which had formed between both articular surfaces. The joint space appeared to have been maintained between both bones. There were also several small erosive lesions at the margins of MT3 and small diffuse pitting on the surfaces of both bones. The underlying trabecular bone appeared very sparse. A tentative diagnosis of an erosive arthropathy with possible underlying osteoporosis was considered, although this is obviously only a suggestion, more evidence would be required for a definitive diagnosis.

Context	**Element**	**Pathology**					
		Arthritis		Trauma	Non-metric Traits	Circulatory	Unknown
		OA	SJD/OP	Distal fracture	Metopism	?Perthes Dis/Avascular Necrosis	
1664	Scapula/R	1					
	Radius/L			1			
	Skull				1		
	Femur/L					?1	
	Fibula/L						1
	Lumbar vert		1				

A left femur was recovered where the femoral head was absent probably due to a destructive process with most of the neck destroyed also. The remaining bone had severe destruction with subequent remodelling. This remodelling was characterized by roughened cortical bone which had a very irregular surface topography including very small areas of porosity. The distal end of the bone did not survive post mortem. The femur appeared light to touch with a thin cortex and sparse inner trabeculae. Diagnoses included Avascular Necrosis and Perthes Disease. The bone also appeared very gracile and it is worth considering if this gracility is due to the individuals reduced mobility.

A grossly thickened fibula shaft with the thickness increasing in a distal direction was also recovered from the above context. The thickening was characterized by sclerotic new bone formation which had the appearance of dripping candle wax interspersed with areas of smoother, plaque-like, sclerotic layering. The medullary cavity had been practically obliterated with the formation of a loosely woven trabecular bone. The bone was very light to touch. Unfortunately the proximal and distal ends of the bone had not survived due to post mortem damage. The cause of this pathology did not appear to be infectious¸ no sinus was present to suggest osteomyelitis although the plaque-like sclerotic hardening could be suggestive of sclerosing osteomyelitis, although again there was no sinus. Bone destruction does not appear to be a characteristic of this disease process rather it is one of bone formation. Malignancy is a consideration although it is difficult to diagnose this with any accuracy, although it would have to be osteoblastic in origin. Another consideration is hypertrophic osteoarthropathy. This condition has a 'candlewax' appearance with bone thickening in the midshaft area. Leri's disease (melorheostosis) is a further consideration. This is a developmental disorder than has the appearance of running candlewax. A further consideration was generalised hyperostosis with pachydermia with bones having a rough, irregular surface although those affected were much heavier than normal and the above bone

is very light to touch. The possible diagnosis is Leri's disease is a possibility although it must be mentioned that Leri's disease is very rare today.

Context	Element	Pathology
		Trauma
		Soft tissue
1665	Tibia/L	?1

A left tibia was recovered which had a small section of cortical bone missing below the tibial tuberosity. Infection did not appear to be a cause although trauma/avulsion was a possibility. However, the tibial tuberosity was completely attached and had no signs of trauma therefore Osgoods-Schlatters disease was dismissed. Diagnosis is unknown at present.

Context	Element	Pathology		
		Arthritis	Trauma	Infection
		Septic arthritis	Distal shaft fracture	NSI
1678	Humerus/L		1	
	Fused Inominate/L+Femur	?1		1

A left femur was recovered which had complete ankylosis of the femoral head to the acetabulum of the corresponding innominate. The fusion was characterized by reactive sclerotic bone formation with porosity around the margin of the acetabulum which was slightly enlarged. The femoral neck also appeared slightly thickened with periosteal new bone formation around the area distal to the fused head. This formation was plaque like in appearance with slight porosity. The diagnosis of the hip joint is possible Septic Arthritis, although TB was a further consideration though there was little destruction or hip shortening. The hip also appeared to be in correct anatomical position. The diaphseal infection which was located below the fused joints was presumed to be a secondary result of the pathological process at the hip joint.

Context	Element	Pathology				
		Arthritis	Trauma	Non-metric Traits	Infection	Congenital
		SJD/OP	Shaft fracture	Apical Bones	NSI	Occipital Bun
1683	Rib/L x2		1			
1392	Rib/L		1			
1700	Thoracic vert	2				
	Ulna/L				1	
1725	Skull			1		1

	Context	Pathology												
		Arthritis					Trauma		Metabolic	Congenital		Infection	Unknown	
		OA	SJD/OP	DJD/OP	SN	Erosive Arthropathy	Wedge Fracture	Midshaft fracture	Rickets	Rib Fusion	Peg incisor	NSI	Osteo-porosis/ OMAL	?Pagets
2011	Patella/L	1												
	Lumbar vert (L5)		1				1							
	Lumbar vert		1											
	Lumbar vert	1												
	Thoracic vert				1									
	Thoracic vert (T12)		1		1									
	Thoracic vert		1											
	Cervical vert	1												
	Sacrum												1	
	Frontal													?1
	Occipital													?1
	Tibia/L											1		
	Prox+Int hand phalange					?1								
	Fused Lumbar vertsx2		1											
	Fused ribsx2									1				
	Peg incisor										1			
	Radius/R							1						
	Fibula/R s/a								?1					
	Femur/R s/a								1					
	Femur/L s/a								1					

An occipital bone fragment was recovered which was heavier and thicker than normal with proimant meningeal vessel impressions on the endocranial surface. The diploe also appeared thickened. A possible diagnosis of Pagets disease was given although this is very tentative without the rest of the skeleton being available for analysis. A frontal bone fragment was also recovered and again like the Occipital bone appeared much thicker and heavier than usual.

A left patella with severe osteoarthritis marked by striation and eburnation on the posterior surface which had resulted in reduced bone thickness was also located.

A fully fused sacrum was also recovered. The anterior surface was very straight with no observable curve, whilst the body of S1 sloped downwards resulting in that following fusion to the lumbar vertebrae the sacrum would have stuck out at angle of 45 degrees. There was also slight remodelling at the greater wing on the right side of S4. The cause of the abnormal non-curvature is unknown although the sacrum is very light to touch which could be suggestive of underlying Osteoporosis. No fractures are evident to suggest a cause for the above abnormal angulation. However, conditions such as osteomalacia do cause pelvic changes, but due to the lack of more skeletal evidence diagnosis will have to remain unknown at present.

A fused proximal and intermediate hand phalange was also recovered. The intermediate phalange was fused at an angle of 45 degrees to the head of the proximal phalange on the palmar surface. The fusion was characterized by complete ankylosis with the destruction of both surfaces. The actual cause of the fusion was unknown although it is presumed to be an erosive arthropathy

Context	**Element**	**Pathology**				
		Trauma	Non-metric Traits			Infection
		BFT	Metopism	Apical Bones	Occipital Bun	Max Sinus
2019	Pariatel/R	1				
	Skull		1	1		
	Skull				1	
	Maxilla/R					1

A small oval shaped depressed area was located on a right pariatel bone. This depressed area was demarcated by a slight ridge of bone. It was presumed to be a healed depressed fracture.

Context	Element	Pathology								
		Arthritis			Non-metric Traits				Congenital	Unknown
		OA	SJD/OP	SN	3rd trochanter	DSA	Metopism	Supraorbital Sutures	Occipital Bun	Lytic lesion ?traumatic origin
2033	Lumbar vert x2			1						
	Thoracic vert		1							
	Femur/L	1								
	Femur/L				1					
	Humerus x2					1				
	Skull						1	1		
	Skull x2								1	
	Tibia/L									1

Context	Element	Pathology			
		Arthritis	Non-metric Traits	Congenital	Metabolic
		SJD/OP	3rd trochanter	Occipital Bun	Rickets
2076	Lumbar vert	1			
	Skull			1	
	Femur/R		1		
	Fibula/R s/a				1

Context	Element	Pathology						
		Arthritis			Trauma	Non-metric Traits	Metabolic	Unknown
		OA	SJD/OP	DJD/OP	Wedge	3rd trochanter	OPOR	?Pagets
2080	Scapula/L	1						
	Sacrum (S1)	1						
	Femur/L	1						
	Femur/L	1						
	Femur/R					1		
	Lumbar vert		1		1			
	Fibula/L						1	
	Cranial fragment x2							?1

A distal end of left fibula was found which had a very thin cortex and very sparse and not tightly woven trabecular bone resulting in that the bone was very light to touch. A possible diagnosis of osteoporosis was given although without the rest of the skeleton it makes diagnosis very difficult.

Two fragments of thickened cranium were located in the above context. The maximum width was 8.8mm and 11mm respectively. The diploe was very thickened and very fine in character. Endocrainally there appeared to be sclerotic hardening on the inner table and the grooves for the meningeal vessels were very prominent. Dagnosis of this pathology was very difficult without the rest of the individual to analyse. A very tentative suggestion of Pagets disease was considered but this is a mere suggestion only.

Context	Element	Pathology
		Arthritis
		SJD/OP
2151	Cervical vert	1

Context	Element	Pathology								
		Arthritis			Trauma		Non-metric Traits	Congenital		Unknown
		OA	SJD/OP	DJD/OP	Distal shaft fracture	SFT	Metopism	Occipital Bun	Sacralization of L5	?Pagets
2188	Lumbar vert (L2)		1							
	Lumbar vert (L3)		1							
	Fused Thoracic verts (T11+12)		1							
	Cervical vert	1								
	Ulna/R				1					
	Skull - Frontal/L					1				
	Skull x2							1		
	Skull						1			
	Sacrum								1	
	Pariatel/L+R									1

A left and right fused pariatel bones with very thickened outer tables was recovered in this context. The diploe in both areas had predominantly disappeared although there were areas of porotic/lytic diploe intermixed with very small areas of sclerotic and more normal diploe. The inner table was also thicker than usual and the cranial fragments were heavy to touch. The endocranial surface meningeal grooves were also very prominent and widened. As usual, due to the disarticulated state of the remains diagnosis was difficult. However, Pagets disease is a consideration as was Fibrous dysplasia which can have similar characteristics to Pagets in its later stages (Ortner 2003).

A sharp force trauma wound on a male skull was also found in this context. The wound was located on the left frontal boss and was roughly oval in shape with a slight central depresson of well remodelled cortical bone. The wound was well healed prior to death with no residual infection.

Context	Element	Pathology	
		Arthritis	Unknown
		SJD/OP	?Perthes/Slipped femoral head
2212	Cervical vert (C1)	1	
	Thoracic vert	1	
	Metacarpal (MC1)	1	
2853	Femur/L		?1

A left femur with severe changes to the femoral head was recovered that had severe osteophytosis formation with extreme lipping and bony overgrowth. The head was very porotic and also slightly flattened. The neck was also slightly shortened at the anterior side. On the medial surface and immediately below the head there was an oval shaped area of raised bone which was thought to be secondary to the head pathology and possibly related to contact with the acetabulum. Diagnosis was difficult however with Perthes disease and a possible slipped femoral head a possibility.

Context	Element	Pathology			
		Arthritis	Infection	Tumour	Metabolic
		SN	Abscess	?Fibroma	Rickets
sk12	Fibula s/a				?1
grave fill of sk190	Thoracic vert	1			
	Maxilla/L		1	?1	

The left maxillary sinus of this bone contained a very irregularly shaped area of new bone growth (neoplasm). It was oval in shape and was positioned on the sinus floor, which it appeared continuous with. It connected with the socket of M1 via a small irregularly shaped sinus. The neoplasm had a hard, osseous consistency and was hollow inside with a large opening in the antero-posterior area, although part of this was due to post mortem bone loss. The outer surface was very irregular while inside was smoother in character although still slightly irregular. It was whitish, grey in colour and was very thin in width. Diagnosis was difficult without further investigation. However, Colard et al (2007) identified the first probable cemento-ossifying fibroma in a right maxilla from Northern France. Although diagnosis is unknown what can be discerned is that it is a probable neoplasm but the actual type would have to await further analysis

Context	Element	Pathology				
		Non-metric Traits				Unknown
		Metopism	nfraorbital foramen	Zygomatic Facial Foramen	3rd trochanter	Extra facets
MS	Rib/L					?1
[NB]						
	Skull			1		
	Femur/R				1	
(NB SPT]	Skull	1	1			
[PL]	Femur/L				1	

Context	Element	Pathology					
		Arthritis	Trauma	Non-metric Trait	Congenital	Infection	Unknown
		DJD/OP	Shaft fracture	Occipital Bun	Occipital Bun	NSI	?age-related
[PP]	Skull				1		
[RO]	Skull			1			
	Skull			1			
	Tibia/R					1	
[RY]	Rib/L		1				
	Fused Manubrium +1st Rib						1
Disartic between sk81-82	Metatarsal (MT1)/L	1					

PHASE 4B-B

Context	Element	Pathology	
		Arthritis	Trauma
		SJD/OP	Fracture
[ACF]	MT2/L		?1
	MT3/L		?1
	Lumbar vert	1	

PHASE ?4B

Context	Element	Pathology	
		Trauma	Congenital
		Fracture	Occipital Bun
508	Metatarsal (MT3)	1	

	Skull		1

Context	Element	Pathology					
		Arthritis					Metabolic
		OA	SJD/OOP	DJD/OP	SN	Wedge fracture	Rickets
760	Cervical vert	1					
	Thoracic vert (T12)		1		1	1	
	Femur/R s/a						?1

PHASE 4A-4B

Context	Element	Pathology				
		Arthritis		Tumour	Metabolic	Infection
		SJD/OP	SN	Button Osteoma	Rickets	NSI
1080	Thoracic vert	1	1			
	Lumber vert (L4)	1				
	Lumber vert	1				
	Tibia/L s/a				?1	1
	Frontal/R			1		

A small button osteoma was found on the right frontal bone of a female skull from the above context.

PHASE 4-5

Context	Element	Pathology					
		Arthritis				Metabolic	Infection
		OA	SJD/OP	DJD/OP	SN	Rickets	NSI
312	Temporal						1
313	Lumbar vert				1		
	Lumbar vert	1					
	Lumbar vert (L2)			1			
	Thoracic vert				1		
	Fused thoracic vertx3			1			
	Thoracic vert (T10)			2			
	Thoracic vert (T12)				1		
	Scapula/R			1			
	Femur/R s/a					?1	1
	Tibia/L					1	
	Metatarsal (MT1)/L			1			

Context	Element	Pathology								
		Arthritis		Trauma	Non-metric Trait			Congenital		DISH/AS
		OA	SJD/OP	BFT	Metopism	Saggital Suture	Maxillary Tori	Occipital Bun	Saralization of L5	AS
643	Skull			1						
	Skull				1					

	Skull					1		1		
	Skull						1			
	Sacrum								?1	
	Lumbar vert (L3)	1								
	Fused thoracic vertsx5		?1							?1

A predominantly female skull was located in the above context which contained a probable Pond fracture on the left pariatel boss. The edges were smooth and rounded indicating long standing healing**.**

Five fused thoracic vertebrae were also recovered that were fused with thin, lateral syndesmophytes of bone on the anterior and left and right lateral sides of the bodies. Although severely eroded there was no evidence of porosity or eburnation or more severe osteophyte formation indicating spinal joint disease. A very tentative diagnosis of AS was given with spinal joint disease as a differential diagnosis.

Context	Element	Pathology	
		Non-metric Trait	Congenital
		Metopism	Occipital Bun
[XI]	Skull	1	
	Skull		1

PHASE 5

Context	Element	Pathology					
		Arthritis				Congenital	Infection
		OA	SJD/OP	DJD/OP	SN	SBA	NSI
104	Cervical vert	1					
	Thoracic vert		2				
	Fibula/R			1			
315	Lumbar vert		1		1		
	Femur/R						1
	Sacrum		1				
	Cervical vert (C1)					1	

Context	Pathology																			
600	Arthritis				Trauma						Non-metric Trait		Congenital		Metabolic	Infection		Tumour	Medical Treatment	Unknown
Element	OA	SJD/OP	DJD/OP	SN	Sub-luxation	Spondy-lolysis	Distal fracture	Midshaft fracture	Avulsion of Tibial Tuberosity	SFT	Metopism	Lambdoid ossicle	Occipital Bun	Sacral-ization of L5	Rickets/ OMAL	NSI	Max Sinus	?lytic lesion	Craniotomy	
Lumbar vert (L5)				1																
Lumbar vert (L5)			1																	
Lumbar vert	1																			
Thoracic vert		2																		
Thoracic vert	1																			
Cervical vert	1																			
Fused Cervical (C5+6)	1																			
Cervical vert		1																		
Clavicle/R	1																			
Lumbar vert (L5)														1						
Humerus/L					?1															
Sacrum+?L5														1						
Metatarsal (MT1)																				1
Innominate/R																		1		
Scapula/L																1				
Maxilla/R s/a																	1			
Occipital s/a																1				
Femur/R																1				
Femulr/L s/a																1				
Fibula/L																1				
Occipital s/a													1							
Skull													3							
Skull												2								
Skull											1		1							
Femur/R s/a															?1					
Femur/L															?1					
Femur/R															1					
Tibia/R s/a															?1					
Tibia/R															?1					
Lumbar vert (L5)						1														

Radius/R							1													
Femur/R								1												
Fibula/L								1												
Tibia/R									1											
Tibia/L										1										
Tibia/R								1												
Skull																			1	

A fully fused left humerus was recovered that had a flattened head with decreased angulation between the head and shaft. There were no obvious degenerative changes to the joint and a diagnosis of possible subluxation was given.

An adult left tibia with 2 distinct areas of sharp force trauma was also recovered in (600). The first area was located at the proximal end of the bone on the posterior-lateral surface. The wound was linear and had exposed the underlying trabeculae. No bone healing was evident. The second area was at the distal end of the bone and was again located on the posterior-lateral surface. There were two wounds in this area and both were again linear and the underlying trabeculae had been exposed. No wound healing was again evident and it was presumed that death occurred during or soon after.

This context also contained a fully fused right tibia that had a partially detached tibial tuberosity. A possible diagnosis of Osgood-Schlatters disease was considered.

A probable male skull was also found that had a craniotomy performed as a probable post mortem investigation. The cranium was not present and had been lost. The sides of the cut were smooth and horizontal and would have probably administered using a sharp implement. At the occipital bone the cut marks slightly overlapped one another.

A 1st metatarsal was also recovered. The base and shaft appeared normal while the head had severe malformation. The head was reduced in height and had a flattened surface. Its margin was irregular and slightly larger than normal. The surface comprised of cortical bone which had a very 'lobulated' appearance. There were separate fissures between the separate lobules that had smooth and rounded margins. There did not appear to be active infection or lytic lesions evident on the bone. There were no fractures or degenerative changes observable either. The actual diagnosis is rather difficult at present. Pseudo gout can be dismissed due to the absence of lytic lesions as can traumatic injury as there was no evidence. Degenerative changes are also ruled out due to there being no osteophtyic changes, porosity or eburnation evident on the margin. Vascular injury is a possible diagnosis. However, Freibergs disease which involves the metatarsal usually affects the 2nd or 3rd metatarsal and not the 1st, although it does have a flattened and irregular appearance at its head. Pseudoarthrosis was another possible diagnosis, although this is difficult to diagnose due to the absence of the proximal end. Congenital malformation was considered although no condition could be located at present to fit the above description. The diagnosis is unknown at present.

An oval shaped lytic lesion that had completely perforated the ilium of a right innominate was located in this context. It had very well demarcated edges which were sharp and rough to touch. Surrounding the edges was reactive bone with very slight grey woven bone and porotic lesions. It was also slightly raised in relation to the surrounding cortical bone. Immediately adjacent to this lesion was a further lesion which was more reactive in character than lytic. There was slight erosion to the cortical bone with slight woven bone and porotic lesions. It was the same on both sides of the ilium. At the inferior lytic spine there was a further small area of reactive bone with porosity. The rest of the innominate was normal. The diagnosis was rather difficult due to there being only one bone present. Brucellosis and TB both cause lytic cavitation although TB of the ilium is very rare. A probable diagnosis is of a neoplastic lesion. The probable cancerous lesion had a more lytic origin rather than osteoblastic. It is unknown what type of cancer it was, athough there is a possibility that it is metastatic in origin rather than being a primary foci due to their being other lesions nearby, although this is very, very tentative only.

Context	Element	Pathology			
		Arthritis	Trauma	Infection	Unknown

		DJD/OP		NSI	?Sipped femoral epiphyses/Perthes
603	Ulna/L	1			
665	Femur/R	1	?1	?1	?1

The above context contained a right fused femur with probable multiple pathological processes occurring. The head, despite quite extensive post mortem damage, was flat in profile with quite severe bone formation which had distorted the surface. This bone was plaque like in appearance with porosity. An area of eburnation was also noted. The head also appeared to be slightly out of alignment in a distal direction. The neck was very short. The proximal end of the shaft was also slightly thickened and contained porosity. A diagnosis of probable osteoarthritis could be given although was probably secondary to the primary pathological process. This primary diagnosis was difficult to diagnose with assurance since several pathologies could fit the above description. However, a slipped femoral epiphyses is one to consider as is Perthes disease although this does seem more unlikely. Trauma should also be considered although no fracture line was evident. The slight thickening and porosity of the proximal shaft may also indicate a non-specific infection was present at time of death.

Context	**Element**	**Pathology**						
		Arthritis			Trauma		Non-metric Trait	Medical Intervention
		OA	SJD/OP	DJD/OP	Crush fracture	distal fracture	Mandibular tori	PM incision
715	Thoracic vert			1				
716	Lumbar vert		1					
	Metatarsal (MT1)/R			1				
	Metatarsal (MT1)/L			1				
	Prox foot phalange				1			
720	Mandible						1	
	Cervical vert	1						
745	Radius/R			1		1		
	Mandible						1	
	Sternum							1

The right half of a sternal body was recovered which had a vertical cut down its length. This cut had straight edges and was obviously performed using a sharp implement. The cut is not recent damage and it could be suggested that it was performed during a medical procedure such as a post mortem, although this is tentative only.

Context	**Element**	**Pathology**			
		Arthritis	Trauma	Non-metric Traits	Infection
		SJD/OP	Enthesopathy	Apical Bones	Osteomyelitis
1171	Tibia/L		1		
2074	Lumbar vert (L4)	1			
	Skull			1	

2772	Ulna/R				1

A proximal end of a fully fused right ulna with new bone formation and thickening of the shaft was located in the above context. Three small sinuses were also located on the anterior surface. A possible diagnosis of Osteomyelitis was given.

Context	**Pathology**											
[FA]	Arthritis				Trauma	Non-metric traits		Metabolic		Congenital		Unknown
	OA	SJD/OP	DJD/OP	SN	Distal fracture	Inca bone	Maxillary tori	CO	Rickets/ OMAL	Sacralization of L5	SBO	?tumour/ lesions
Cervical vert		1										
Fused thoracic vertx2		1										
Sacrum x3										?1		
Sacrum										1	1	
Innominate/L			1									
Sacrum										?1		
Frontal s/a								1				
Femur/R s/a									?1			
Femur/L s/a									1			
Ulna/R					1							
Skull						1						
Skull							1					1

A male skull with a double inca bone was located in the above context.

A further male skull with 13 bony lesions around the external perimeter of the maxilla from right PM2 to left PM2 was also located. These lesions were small, roughly round shaped exostosis with well demarcated edges capped with smooth cortical bone. The average diameter of these lesions was 6mm and the height varied from 0.5 2-1 mm. The lesions positioned above the molars were not as severe as those located at the incisors. Diagnosis was very difficult without further investigation. However, they are obviously multi-focal rather than unifocal. The maxilla also contained internal maxillary tori from PM2 to PM3 bilaterally.

Context	Element	Pathology				
		Arthritis			Congenital	Infection
		OA	SJD/OP	DJD/OP	Sacralization of L5	Osteomyelitis
[FD]	Sacrum				?1	
	Tibia/R					?1
[FC]	Lumbar vert		1			
	Lumbar vert (L5)		1			
	Clavicle/R			1		
	Tibia/R	1				

A right fused adult tibia was recovered with probable osteomyelitis. The distal third of the shaft was affected with an open sinus evident.

Context	Element	Pathology				
		Arthritis		Trauma	Congenital	Infection
		SJD/OP	DJD/OP	SFT	Occipital Bun	NSI
[FT]	Skull				1	
[GD]	Thoracic vert (T10)	1				
	Lumbar vert	1				
	Humerus/R		1			
	Tibia/L					1
	Skull			1		

A probable male skull with a puncture wound on the right frontal bone was located in this context. The wound was slightly oval in shape and had completely pierced the bone with contact with the underlying soft tissue a possibility. Two radiating fractures were also observed.

Context	Element	Pathology	
		Arthritis	DISH/AS
		Erosive Arthropathy	
[GJ]	Fused Innominate/R+Sacrum		?1
	Patella/L	?1	

A left patella was recovered with an erosive lesion with reactive new bone growth around its margin. A possible diagnosis of an erosive arthropathy was given.

A right adult male innominate with fused 1st sacral bone was also found in this context. The elements were fused at the right auricular surface which was characterized by a smooth bony bridge in the anterior area. Slight osteophtye formation was also found on the iliac crest, ischium and the margin of the auricular surface and the obturator foramen. A possible diagnosis of AS was given with a differential diagnosis of DISH, although this was tentative only.

PHASE 5A

Context	Element	Pathology		
		Arthritis	Trauma	Infection
		SN	Shaft	?NSI
640	Thoracic vert	2		
	Thoracic vert (T12)	1		
	Lumbar vert	1		
	Ulna/L			1
	Rib		1	

A left ulna was recovered that had fairly severe cortical bone thickening on the posterior midshaft area making the bone appear slightly bowed in shape. It also contained porosity and lamellar bone formation. The medullary cavity appeared narrowed with roughened bone formation. Diagnosis of a non-specific infection was considered.

Context	Element	Pathology

		Trauma
		SFT
664	Skull	1

A possible male very partial cranium was recovered that contained three sharp force trauma wounds. Two were located on the area of the frontal eminence and had rounded edges indicative of remodelling. The third wound was located on the left pariatel bone adjacent to the temporal suture and again had evidence of remodelling. The endocranial surface had not been affected and no infection was noted. All wounds appeared well healed prior to the individual's death

Context	**Element**	**Pathology**			
		Arthritis		Trauma	Infection
		OA	SJD/OP	?Disc herniation	Unknown
689	Cervical vert	1			
727	Cervical vert	1			
	Humerus/R	1			
728	Lumbar vert	1		?1	?1

An unidentified lumber vertebra was recovered that contained a large, round lytic lesion measuring 11.4mm in diameter on its superior body. Its edges were rough and irregular with sequestra in the cavitation which was exposed to a depth of 5.1mm. There was no vertebral collapse although slight irregularity to the superior and inferior body margin with osteophtye formation. A possible diagnosis of SJD could be ascribed to the body margin irregularity. Possible disc herniation was diagnosed for the lytic lesion.

Context	**Element**	**Pathology**					
		Arthritis					Non-metric Traits
		OA	DJD/OP	Sero-neg Arth	SN	Trauma	Metopism
779	Ulna/L					Distal fracture	
						1	

781	Thoracic vert	1					
	Thoracic vert				1		
778	Prox hand phalange		1				
	Clavicle/R		1				
	Lumbar vert (L5)	1			1		
	Int+distal hand phalange			?1			
	Skull					1	

An ankylosed intermediate and distal hand phalange was recovered from the above context. The intermediate phalange had severe erosion at the proximal end which had produced a cup deformity. The joint margin at this location had been completely destroyed and the marginal rim had very irregular edges with reabsorption evident. There was also a lytic lesion on the side which had a very rounded edge. Its proximal head had been destroyed and had a more flattened and wider surface than normal at this end. The distal phalange had no reduction in length. Its proximal end and shaft appeared normal although there was very slight porosity at the terminal end on the palmar side of head. However, at the distal end it was fused to the intermediate phalange head. The articular surface has been destroyed and was irregular in outline with reactive bone which has resulted in ankylosis. The fused distal phalange also had some deviation to the side. No fracture or infection was present which would suggest that the fusion was not caused by septic arthritis. Although rheumtoid arthritis affects the hands there is generally no ankylosis. Psoraitic arthritis is a possibility. This can be characterised by a cup and pencil deformity of the phalanges and also ankylosis (leprosy can also cause this although this is usually located in the feet). A tentative diagnosis of a sero-negative arthropoathy was given.

Context	Element	Pathology
		Arthritis
		DJD/OP
[XD]	Rib/L	1

PHASE 5B

Context	Element	Pathology	
		Arthritis	Metabolic
		DJD/OP	Rickets/OMAL

619	Innominate/R	1	
[FS]	Radius/R		?1

PHASE 5C

Context	Element	Pathology
		Non-metric Traits
		Mental foramen
[QK]	Mandible	1

NATURAL PHASE

Context	Element	Pathology
		Congenital
		Occipital Bun
898	Skull	1

UNSTRATIFIED MATERIAL

Context	Element	Pathlogy			
	Disartic bone from unknown feature in coffin	Arthritis		Non-metric Trait	Congenital
		OA	SJD/OP	3rd trochanter	Occipital Bun
	Thoracic vert		1		
	Lumbar vert	1			
	Femur/L			1	

898	Skull				1

UNPHASED CONTEXT

Context	Element	Pathology
		Arthritis
		SN
1341	Lumbar vert	1

PHASE	ADULT NO.	ELEMENT	SUB-ADULT NO.	ELEMENT
1	5	Temp-L	2	Age difference
?1	3	T12	1	
1-2	4	MT5-L	3	Age differences
1-3	5	Ulna (PE-L)	6	Frontal and age differences
1-3A	13	Temp-R	21	Age difference and element nos.
1-3B	1		0	
2	3	Scapula-R	2	
2A	3	Fib-L	1	
2-3	71	Temp-R	47	Femur (Prox-L)
2-3A	8	Tibia (PE-R)	13	Humerus (Dist-R) and age differences
2-4	1		1	
2-4b	44	Talus-L	46	Femur and Age differences
2-5	1		0	
3A	27	Temp-L	10	Age difference
3B	5	Radius (PE-R)	3	Age difference
3-4	8	Temp-L	4	Age difference
4	9	Femur (PE-R)	4	Dental and longbone age difference
?4A	8	Humerus (DE-L)	3	Scapula body/L
4A	35	Femur (PE-L)	16	Tibia (Prox-R)
4A-B	1		2	Age difference
4A-4B	9	Femur (PE-R)	3	Age difference
?4B	7	Tibia (L)	6	Age difference
4B	318	Femur (PE-R)	162	Femur (Prox-R)
4B-B	2	(MT1)	1	
4B-5A	3	talus	1	
4B-5	2	CF1	4	Age difference
4-5	10	Temp-L	5	Age difference

5	42	Frontal	16	Tibia (Prox-L)
?5	2	Sex differences	1	
5A	16	MT4/R	8	Humerus (Prox-R)
5B	8	Tibia (DE-R)	5	Age difference
5C	42	Tibia (DE-L)	20	Age difference
Unphased				
U/S				

Photographic list for disarticulated remains included in report:

809	Right femur with possible avascular necrosis
1720	Mandible with gold wire
1720	Rib with coral like lesions
1720	Radius and ulnar synostosis
1720	Right ulna with possible septic arthritis
643	Fused thoracic vertebrae
1780	MT4 with lesion
1507	Ulna
2068	Pubic symphysis with oa
2068	Abnormal bone growth on right innominate
2172	Femur with oa at distal end
600	Craniotomy
2358	Left tib with osteoma
2359	Mandible with canine
1915	Right tibia with osteod osteoma
1903	7 fused thoracic vertebrae
1903	Fused pelvis
1903	Right and left fused pubis
1191	Angulated ribs with facets
1797	Innnominate with ?perthes
728	Lumbar with lytic lesion
778	Fused hand phalanges
600	Subluxation of humeral head
600	Tibia with sft
600	Innominate with lytic lesion
600	Tibia avulsion

600	Mt lobby one
665	R femur slipped epiphyses
FA	Skull with lumps on maxilla
GJ	Fused pelvis
GJ	Patella with erosive arth
GD	Skull puncture wound
128	Fib and tib ossification
668	Humerus stress
706	MT1 erosive arth
724	Baby clavicle
782	Rib ang
843	Hand phalange with ?leprosy
870	Tibia infx2
870	Fused pelvis dish
902	Sft skull
930	Malign sacrum
1053	Tib rickets s/a
1140	Thor verts x8 fused dish
1179	Tib and humerus s/a
948	Femur osteochond
1166	Occip bun
1359	Fracture clavicle
1391	Fused pelvis
1120	Pubic bone oa
1120	Saber skins tibia
1664	Femur av necrosis
1665	Tibial avulsion
1678	Innom septic arth
2011	Patella oa
2011	Hand phalanges fused
2011	Pagets skull

2011	Sacrum no curve
2853	Femur slip epip
1255	Skull sft
Sk190	Max fibroma
1250	Femur and humerus
1151	Tibia osteochond
1308	Sftx5
1619	Lumbar vert with lytic lesion
1660	Mt3 and cf fusion

Chapter 14 Final thoughts

By Paul Duffy

Overall preservation better in earlier rather than late assemblage

Most deaths occur in infancy (c50%) with c 25% occurring in the under 3 years age category .

Once past childhood then good chance of living to +35.

Most adults dead before 50 years old, only c 3% of aged population are over 50

Less child deaths in post 15th c – deaths in the rest of the age categories are fairly similar, suggesting that there may be an underlying reason for a reduction in child deaths

Female and male mortality become closer in post 15th c

Average Male Stature 169 cm – Phase A 167cm, Phase B 170 cm

Average Female Stature 155cm = Phase A 154cm Phase B 156cm

Compares with:

Site and Reference	*Period*	*Av Height cm*	*No*
Isle of May	5th-17th C	172	37
Whithorn (Cardy 1994)	15-16th C	169	128
City Churches, Dundee (Brown & Roberts 2000)	12-15th C	171	30
Glasgow Cathedral (King 1994)	13th-16th C	174	22
Carmelite Friary on the Green (Cardy 1996)	13th-16th C	171	21
Logies Lane, St Andrews (Cardy 1993),	15th-16th C	169	14

Table X: Mean Female Statures from Scottish Medieval Sites

Site and Reference	*Period*	*Av Height cm*	*No*
Whithorn (Cardy 1994)	15-16th C	155	140
City Churches, Dundee (Brown & Roberts 2000)	12 - 15th C	158	27
Glasgow Cathedral (King 1994)	13th-16th C	157	14
Carmelite Friary on the Green (Cardy 1996)	13th-16th C	155	13

Stature increases post 15th C for both men and women

Decrease in female tibial squatting facets in phase B – possibly activity related

Decrease in OA phase B, bigger reduction in females than males. Spinal OA also decreases for both sexes

High instances of young adults with OA spine than modern examples

Significant reduction in Schmorls nodes in females in phase B with an increase in lumbar involvement and a decrease in thoracic involvement

Fairly average prevalence rates for seronegative spondylarthropathies, DISH, rheumatoid arthritis etc

Osteitis and periostitis prevalence rates and occurrences broadly similar to other uk assemblages

Couple of interesting cases of diffuse periostitis

Significant drop in sinusitis rates between phase A and phase B – more marked in males than females

One confirmed syphilis – probably acquired

Trauma

More males than females fracture bones

Less fractures in phase B

Reduction in spinal fractures in phase B

Metabolic

Slightly lower rates of OP than nationally reported - more females than males affected
High prevalence of rickets
High prevalence of infantile scurvy
Higher prevalence of cribra orbitalia in non adults and in females

Overall comments

Assemblage profile is broadly comparable to other assemblages from this period.

General disease prevalence's such as RA are stable and comparable to other assemblages suggesting there are no enhanced genetic factors predisposing the population to such diseases. Rates of trauma etc are also broadly similar to published sites

Life in general becomes less severe from pre 15th century and post 15th century population – height increases, OA decreases, trauma decreases, child burials decrease as a percentage of the burial population may reflect the changed socio-economic status of the individuals buried

Rates of infantile scurvy and rickets are high and remain fairly stable between phase A and phase B - this require further understanding

Decreases in activity related condition such as Schmorls nodes and tibial squatting facets in women appears real and is worth investigating further, particularly in light of increases sinusitis in this group.

SkNo	SkLetter	NewSkID	SkPreserv	Sk75Per	Sk50Per	Sk25Per	Sk0Per	SkAge	SkSex	SkPhase	SkPathNotes
1		0001	G		X			F		4B	
2		0002	G				X	PERI		4B	
3		0003	G				X	I		4B	
4		0004	G		X			I		4B	
5		0005	G	X				C		4B	DENTAL DISEASE
6		0006	G	X				C		4B	
7	A	0007A	G	X				I		4B	
7	B	0007B	P				X	I		4B	
8		0008	P				X	I		4B	
9		0009	ND					ND	ND	ND	
10		0010	G				X	A	NO	4B	MARGINAL OP HANDS FEET
11		0011	A				X	A	NO	4B	
12		0012	A				X	I		4B	
13		0013	A		X			A	M	4B	DENTAL DISEASE; RIGHT MAXILLARY SINUSITIS; DJD ELBOWS, KNEE, ANKLE,FEET; HALLAX VULGUS
14		0014	A			X		I		4B	
15		0015	G		X			A	?M	4B	
16		0016	G				X	A	NO		
17		0017	G			X		C		2-3	SHORTENED RIGHT LEG; SFT ON FRONTAL
19		0019	NS					NS	NS	NS	
30		0030	G			X		OA	M	4B	SJD;DISH;FUSED LEFT HAND;OA LEFT HIP, SHOULDER
31		0031	A				X	A	F	4B	
32		0032	G				X	A	NO	4B	SPICULATED BONE BOTH DISTAL FIBULAE; ENTHESOPATHY MT2-5 AND RIGHT CALCANEUS
33		0033	G	X				AD	?M	4B	SYPHILIS
34		0034	G				X	A	?F	4B	SMALL OSTEOSIS RIBS
35		0035	A	X				OA	F	4B	FUSION C2-3; SJD; OA RIGHT AND LEFT SHOULDER
36		0036	G				X	I		4B	RICKETS

37		0037	ND					ND	ND	ND	
38		0038	G			X		I		4B	
39		0039	G				X	I		4B	
40		0040	G				X	I		4B	
41		0041	G				X	I		4B	
42		0042	P				X	I		4B	
43		0043	G				X	C		4B	
44		0044	A	X				YA	F	4B	DENTAL DISEASE
45		0045	EQ					EQ	EQ	EQ	
46		0046	G				X	A	NO	4B	HALLAX VULGUS
47		0047	G			X		I		4B	
48		0048	G	X				MA	M	4B	FUSION C2-3; KLIPPEL FEIL SYNDROME; SPINA BIFIDA OCCULTA; OP RIBS;SJD; COMPRESION FRACTURE L2
49		0049	G			X		A	M	4B	OMAL; NSI BOTH TIBIAE; ENTHESOPATHY FEMUR, TIBIA
50		0050	A			X		I		4B	
51	A	0051A	P				X	MA	NO	4B	SN
51	B	0051B	P				X	I		4B	RICKETS; NSI LEFT FIBULA
52		0052	G	X				C		4B	LYTIC LESIONS ON ZYGOMATIC AND BOTH ELBOWS; NSI FEMORAE, RIGHT TIBIA, FIBULA, AND BOTH FEET; POSSIBLE TB
53		0053	P			X		PERI		4B	
54		0054	A				X	A	NO	4B	DJD KNEES; NSI LEFT TIBIA, MT5; ENTHESOPATHY BOTH PATELLAS, FIBULAE, TIBIAE; FUSION OF 5TH INTERMIDIATE AND DISTAL FOOT PHALANGE
55		0055	P	X				MA	M	4B	AVULSIVE IJ L FIB; NSI FIB;SJD
56		0056	G		X			I		4B	
57		0057	P			X		A	NO	4B	
58		0058	A			X		A	NO	4B	
59		0059	G				X	I		4B	FUSION INTERMIDIATE AND DISTAL PHALANGE MT?2
60		0060	G	X				OA	M	4B	DENTAL DISEASE; FUSED RIB HEADS
61		0061	P				X	I		4B	

62		0062	A			X		I		4B	
63		0063	G	X				OA	M	4B	DENTAL DISEASE; CO;OA RIGHT CLAVICLE;?OMAL
64		0064	A			X		A	M	4B	NSI LEFT FEMUR
65		0065	G		X			I		4B	
66		0066	A			X		I		4B	
67		0067	G			X		C		4B	RICKETS
68		0068	G			X		PERI		4B	
69		0069	G		X			YA	M	4B	SFT LEFT FEMUR; BONE FORMATION RIGHT PATELLA; FUSION MT4or5 INTERME+P461DIATE AND DISTAL PHALANGES
70		0070	A				X	C		4B	
71		0071	G		X			I		4B	
72		0072	A			X		I		4B	
73		0073	G				X	A	?F	4B	NSI LEFT FEMUR
74		0074	A		X			YA	?F	4B	DJD RIGHT KNEE; NSI LEFT TIBIA
75		0075	G	X				YA	F	4B	DENTAL DISEASE; ENTHESOPATHY RIGHT CLAVICLE
76		0076	G				X	A	?M	4B	
77		0077	G			X		A	M	4B	NSI LEFT HUMERUS, FEMUR, TIBIA, RIGHT FIBULA; ENTHESOPATHY HUMERUS, FEMUR
78		0078	ND					ND	ND	ND	
79		0079	P				X	C		4B	
80		0080	P				X	A	M	4B	
81		0081	P				X	A	NO	4B	ENTHESOPATHY RIGHT ILIUM
82		0082	A			X		A	NO	4B	FRACTURE L TIBIA;ENTHESOPATHIES PATELLA; OA LEFT NAVICULAR; DJD MT3-5; SJD; SN
83		0083	P				X	N/O		4B	
84		0084	A			X		I		4B	DENTAL DISEASE;DIFFUSE PERIOSTITIS; CONGENITAL SYPHILIS?
85		0085	G		X			MA	M	4B	BUTTON OSTEOSARCOMA RIGHT FEMUR
86		0086	G		X			MA	M	4B	DENTAL DISEASE
87		0087	G		X			YA	F	4B	DENTAL DISEASE; FLARING OF STERNAL ENDS OF LEFT RIB
88		0088	A		X			MA	?F	4B	SN;SJD; NSI RIGHT FEMUR; ENTHESOPATHY

											PELVIS
89		0089	P		X			A	?M	4B	DENTAL DISEASE;SJD
90		0090	G	X				MA	M	4B	DENTAL DISEASE; FUSED INTERMIDIATE AND DISTAL PHALANGE; SN AND OP T12, L1 AND L5
91		0091	P		X			AD	NO	4B	
92		0092	A		X			A	?M	4B	OA SPINE; SN
93		0093	A		X			MA	F	4B	DENTAL DISEASE; S1 CONGENITAL DEFECT
94		0094	A			X		A	F	4B	DJD RIGHT SHOULDER, RIBS, KNEE, 1ST RIGHT MT; ENTHESOPATHY RIGHT ULNA, HUMERUS, PATELLA, FIBULA AND CALCANEUS; OMAL OR OPOR; FUSION OF INTERMIDIATE AND DISTAL 5TH RIGHT MT
95		0095	A		X			MA	F	4B	
96		0096	A			X		I		4B	
97		0097	A		X			C		4B	SCAPHOCEPHALY; WOVEN BONE BOTH INNER TEMPORALS;
98		0098	G	X				MA	M	4B	SJD;DJD RIGHT SACRO-ILIAC JOINT, RIBS, STERNOCLAVICULAR; OSTEOMA LEFT SCAPULA; ENTHESOPATHIES; DENTAL DISEASE
99		0099	G			X		MA	F	4B	SJD; SN; CONGENITAL MALFORMATION OF SPINOUS PROCESS OF S1
100		0100	A	X				MA	M	4B	OA RIGHT ELBOW, RIBS, RIGHT FIBULA AND NAVICULAR; SN; ENTHESOPATHY RIGHT FIBULA; NSI TIBIAE AND FIBULAE;PSEUDOPATHOLOGY AT RIGHT TALUS
101		0101	A			X		MA	M	4B	DJD LEFT SHOULDER; SJD; DJD 1ST MT; POSSIBLE EARLY DISH OR AS; ENTHESOPATHY LEFT FEMUR, PELVIS
102		0102	A			X		MA	M	4B	DENTAL DISEASE; SFT SKULL
103		0103	G			X		YA	F	4B	
104		0104	A			X		A	NO	4B	DENTAL DISEASE
105		0105	G	X				YA	M	4B	NSI RIGHT FEMUR, RIGHT TIBIA; ENTHESOPATHY PATELLA
106		0106	G		X			MA	M	4B	METASTATIC CANCER; SN; DJD LEFT SHOULDER; ENTHESOPATHY RIGHT FIBULA

107		0107	G				X	A	NO	4B	
108		0108	P			X		A	M	4B	
109		0109	P				X	I		4B	
110		0110	A	X				MA	?M	4B	?OMAL; DJD COSTOVERTEBRAL JOINT; DISH; COMPRESSION FRACTURE T10/L3; SN; ENTHESOPATHY RIGHT PELVIS
111		0111	G				X	A	NO	4B	
112		0112	A	X				MA	F	4B	AVULSIVE INJURY TO PROXIMAL END OF RIGHT FIBULA; SN; DENTAL DISEASE
113		0113	G				X	A	NO	4B	
114		0114	EQ					EQ	EQ	EQ	
115		0115	G				X	A	F	4B	
116		0116	G	X				MA	F	4B	SACRALISATION LEFT SIDE; ?EROSIVE LESION BOTH FEMORAE
117		0117	P			X		C		4B	RIGHT CO
118		0118	A		X			YA	?M	4B	ENTHESOPATHY BOTH CALCANEUS, MT5, LEFT TIBIA; SJD; SACRALISATION 1ST COX;DJD R MT1
119		0119	G	X				I		4B	
120		0120	G	X				I		4B	?SCURVY
121		0121	G	X				YA	M	4B	is 045 - DENTAL DISEASE; KNOCK KNEES
122		0122	G		X			C		4B	
123		0123	G		X			I		4B	
124		0124	P			X		I		4B	
125		0125	A			X		I		4B	RICKETS
126		0126	A				X	I		4B	
127		0127	A			X		OA	F	4B	OSTEOCHONDRITIS DISSECANS RIGHT HUMERUS
128		0128	P				X	I		4B	
129		0129	P		X			A	NO	4B	HEALED FRACTURE RIGHT TIBIA
130		0130	A	X				YA	F	4B	
131	A	0131A	A				X	A	NO	4B	DJD MT 1; HEALED FRACTURES 3 LEFT PROXIMAL FOOT PHALANGES
131	B	0131B	P			X		A	?M	4B	DENTAL DISEASE
132		0132	NS					NS	NS	NS	

133	A	0133A	A			X		MA	?M	4B	OA RIGHT AND LEFT SHOULDER;POSSIBLE HEALED FRACTURE LEFT HUMERUS OR OMAL
133	B	0133B	A				X	A	NO	4B	
134		0134	G				X	A	NO	4B	SJD; SACRALISATION L6
135		0135	A	X				A	?M	4B	DENTAL DISEASE; DJD MANDIBLE, TALUS; NSI DISTAL TIBIA; FUSION OF 4TH OR 5TH FOOT PHALANGE
136		0136	A		X			MA	M	4B	OP LEFT SACROILIAC JOINT; ENTHESOPATHY PATELLA AND CALCANEUS; HEALED FRACTURE RIGHT FIBULA; FUSION OF 5TH MT INTERMIDIATE AND DISTAL PHALANGES
137		0137	G	X				YA	F	4B	DENTAL DISEASE; TARSAL COALITION CONGENITAL DEFECT LEFT MT3 AND 3 CUNEIFORM; ENTHESOPATHY LEFT HUMERUS
138		0138	G	X				F		4B	
139		0139	P			X		C		4B	
140		0140	G				X	A	NO	4B	
141		0141	G	X				OA	F	4B	OPOR;OA RIGHT SHOULDER ,RIGHT HUMERUS, MC1; CRUSH FRACTURE LUMBAR;NSI FIBULAE
142		0142	P			X		A	NO	4B	POROTIC HYPEROSTOSIS; MAXILLARY AND FROTAL SINUSITIS; DENTAL DISEASE; BILATERAL NSI TIBIAE, CALCANEI, MT1
143		0143	G				X	PERI		4B	
144		0144	A			X		OA	F	4B	OA STERNOCLAVICULAR JOINT, LEFT HAND, PUBIC SYMPHYSIS; SN; ENTHESOPATHY LEFT PELVIS;SJD
145		0145	G		X			C		4B	
146		0146	A	X				I		4B	POSSIBLE RICKETS
147		0147	A			X		YA	F	4B	SJD L5
148		0148	G				X	A	NO	4B	
149		0149	G	X				I		4B	
150		0150	A		X			A	NO	4B	NSI TIBIAE AND FIBULAE; ENTHESOPATHY RIGHT CALCANEUS; ADDITIONAL ARTICULAR SURFACE BOTH MT1
151		0151	G				X	I		4B	

152		0152	P		X			A	?M	4B	SJD
153		0153	P		X			A	?M	4B	OA LEFT SHOULDER;OA LEFT AND RIGHT DISTAL FEMUR;OA LEFT HAND
154		0154	G	X				MA	M	4B	SJD;DENTAL DISEASE;ENTHESOPATHIES HUMERUS,ILIUM,CALCANEUS,FEMUR,PATELLA;NSI FEMUR
155		0155	P				X	A	NO	4B	OSTEITIS ON LEFT TIBIA
156		0156	A		X			YA	?M	4B	DENTAL DISEASE
157		0157	A		X			YA	F	4B	DENTAL DISEASE; SJD
158		0158	G				X	A	NO	4B	OSTEOCHONDROMA RIGHT TIBIA
159		0159	P			X		MA	F	4B	POSSIBLE OPOR; DJD SHOULDER, ILIAC CREST;DENTAL DISEASE
160		0160	A				X	A	NO	4B	
161		0161	A			X		A	M	4B	
162		0162	G	X				OA	M	4B	DENTAL DISEASE;OA SHOULDER; SJD;SN;PERTHES RIGHT SIDE; ENTHESOPATHY LEFT ULNA, FEMORAE,LEFT PATELLA
163		0163	A				X	YA	NO	4B	DJD COSTOVERTEBRAL JOINT; SN; POSSIBLE DISC HERNIATION T9
164		0164	P				X	A	NO	4B	HEALED RIB FRACTURES
165		0165	G				X	A	NO	4B	
166		0166	G	X				MA	F	4B	OA ULNA
167	A	0167A	G				X	A	F	4B	SJD; OSSIFICATION OF POSTERIOR LONGITUDINAL LIGAMENT THORACIC REGION AND L1-2; SN
167	B	0167B	G	X				YA	NO	4B	SACRALISATION , HEALED RICKETS
168		0168	A			X		MA	F	4B	DENTAL DISEASE; DJD SHOULDER AND ELBOWS
169		0169	A			X		C		4B	
170		0170	G			X		MA	F	4B?	ENTHESOPATHY RIGHT FEMUR,PATELLA AND PELVIS
171		0171	G			X		MA	M	4B?	SJD; DJD SHOULDER;DENTAL DISEASE
172		0172	G	X				I		4B	RICKETS/SCURVY

173		0173	A	X				MA	F	4B	DENTAL DISEASE; RIGHT MAXILLARY SINUSITIS; SJD; ENTHESOPATHY HANDS, PELVIS, PATELLA; NSI TIBIAE, FIBULAE, FEET;?RA/PA
174		0174	A		X			I		4B	
175		0175	A				X	C		4B	
176		0176	G			X		YA	M	4B	BILATERAL MAXILLARY SINUSITIS; DENTAL DISEASE;SN; SFT SKULL(8) AND MANUBRIUM (1);REMODELLING ON LEFT NASAL NOTCH
177		0177	A				X	YA	?F	4B	DJD RIGHT ELBOW; BILATERAL OA ON WRISTS
178		0178	P				X	A	NO	4B	
179		0179	A				X	OA	NO	4B	HEALED FRACTURE RIGHT RIB; EXTENSIVE OSSIFIED CARTILAGE AT RIB ENDS
180		0180	G			X		A	F	4B	PERIOSTITIS LEFT TIBIA OR SCLEROSING OSTEOMYLITIS OF GARRE; FUSION OF INTERMIDIATE AND DISTAL 5TH MT
181		0181	A			X		YA	?F	4B	DJD RIGHT WRIST, BOTH HANDS, LEFT KNEE; SACRALISATION L5; ENTHESOPATHY LEFT PHALANGE, LEFT FEMUR, TIBIA, CALCANEUS AND MT5; ADDITIONAL ARTICULAR SURFACE RIGHT MT1
182		0182	A		X			MA	M	4B	OA LEFT SHOULDER, ELBOWS, KNEES; HEALED RIB FRACTURES R8-12; SJD; SN; NSI TIBIA AND FIBULA; ENTHESOPATHY LEFT FEMUR AND BOTH CALCANEI; SACRALISATION OF COX1; ADDITIONAL ARTICULAR SURFACE RIGHT MT1; FUSED PHALANGES
183		0183	P				X	C		4B	
184		0184	G				X	A	NO	4B	
185		0185	A		X			YA	M	4B	NSI OCCIPITAL; ADDITIONAL ARTICULAR SURFACE RIGHT ILIUM
186		0186	G				X	A	NO	4B	ENTHESOPATHY LEFT PATELLA; DJD RIGHT KNEE; NSI RIGHT TIBIA

187		0187	G	X				MA	F	4B	DJD RIGHT TEMPOROMADIBULAR JOINT; COSTOVERTEBRAL JOINT; RIGHT HAND; BOTH KNEES, BOTH MT1, HUMERI; RIGHT ULNA, HAND;SJD; DENTAL DISEASE
188		0188	P				X	N/O		4B	
189		0189	G				X	A	NO	4B	
190		0190	A				X	A	?F	4B	BILATERAL OA KNEES, RIGHT CALCANEUS; ENTHESOPATHIES BOTH CALCANEI; DJD LEFT CUBOID
191		0191	NS					NS	NS	NS	
192		0192	NS					NS	NS	NS	
193		0193	NS					NS	NS	NS	
194		0194	NS					NS	NS	NS	
195		0195	NS					NS	NS	NS	
196		0196	NS					NS	NS	NS	
197		0197	A				X	A	NO	4B	
198		0198	G				X	YA	?M	4B?	FUSION 1ST AND 2ND RIBS; SN; ENTHESOPATHIES BOTH CLAVICLES
199		0199	A			X		C		4B	
200		0200	A				X	A	NO	4B	NSI TIBIAE, RIGHT FIBULA; ENTHESOPATHY ON TIBIAE
201		0201	A	X				C		4B	DENTAL DISEASE
202	A	0202A	G				X	A	NO	4B	
202	B	0202B	A	X				YA	M	4B	BILATERAL FRONTAL SINUSITIS AND MAXILLARY SINUSITIS; SN; COMPRESSION FRACTURE L5; SPINA BIFIDA OCCULTA; SFT SKULL
203		0203	G	X				YA	M	4B	DENTAL DISEASE;RICKETS;SN; OA RIGHT SHOULDER
204		0204	G			X		I		4B	
205		0205	G				X	PERI		4B	
206		0206	P			X		A	M	4B	KLIPPEL-FEIL SYNDROME C2-3;SN;DISH; DJD RIGHT WRIST AND MT1, LEFT KNEE; ENTHESOPATHY LEFT FEMUR AND PATELLA, BOTH CALCANEI

207		0207	A				X	MA	F	4B	DENTAL DISEASE; UNHEALED FRACTURE AT RIGHT PELVIS; NSI PELVIS, FEMORAE AND RIGHT TIBIA
208		0208	P				X	A	NO	4B	
209		0209	A	X				A	M	4B	DENTAL DISEASE; SJD;DJD SHOULDERS; POSSIBLE PERTHES ON RIGHT FEMUR AND 2DRY OA ON HIPS; ABSENT OSSICLE LEFT CALCANEUS; ADDITIONAL ARTICULAR SURFACE BOTH MT1
210		0210	A				X	C		4B	
211		0211	G		X			MA	F	4B	CO LEFT ORBIT; ADDITIONAL RIGHT SACRAL FACET; DJD ON RIGHT RIBS; ENTHESOPATHY OF CALCANEI; DENTAL DISEASE; ASSYMMETRY ON SKULL
212		0212	G		X			C		4B	DENTAL DISEASE;MAXILLARY SINUSITIS LEFT; HEALED RICKETS FEMORAE AND TIBIAE; FUSION DISTAL AND INTERMDIATE 5TH FOOT PHALANGES
213		0213	G	X				MA	M	4B	SJD; ENTHESOPATHIES PATELLA, ULNA,CALCANEUS; DJD HANDS, RIGHT FOOT; SACRALISATION OF COX1; SN; DENTAL DISEASE
214		0214	A	X				MA	F	4B	SLIPPED PUBIC SYMPHYSIS?
215		0215	P		X			A	?F	4B	CO
216		0216	G				X	A	NO	4B	
217		0217	G	X				MA	F	4B	DENTAL DISEASE; RICKETS; TRAUMA WRIST AND RIBS; OPOR
218		0218	P				X	YA	NO	4B	
219		0219	A	X				YA	M	4B	DENTAL DISEASE; NSI FEMORAE, TIBIAE AND FIBULAE, 3 UNIDENTIFY RIBS; BOTH MTC2 BEND PLANTARLY
220		0220	G	X				C		4B	DENTAL DISEASE
221		0221	A				X	A	F	4B	DJD RIGHT KNEE; ENTHESOPATHY; DENTAL DISEASE
222		0222	A		X			MA	F	4B	DENTAL DISEASE; SJD; ENTHESOPATHY BOTH CALCANEI; OSTEOMA FRONTAL SINUS
223		0223	P				X	A	NO	4B	
224		0224	G				X	A	NO	4B	

225		0225	G			X		I		4B	
226		0226	G				X	C		4B	
227		0227	A				X	A	NO	4B	ENTHESOPATHY RIGHT FIBULA
228		0228	A				X	A	M	4B	BUTTOM OSTEOMA LEFT PARIETAL; MACROPOROSITY RIGHT ACROMIOCLAVICULAR; OP T7-9 EARLY DISH?
229		0229	P			X		AD		4B	DENTAL DISEASE
230		0230	G				X	C		4B	
231		0231	G				X	I		4B	
232		0232	G			X		OA	M	4B	PITTING AT FEMORAL HEAD, PERIOSTITIS L FEMUR; ENTHESOPATHY LEFT FEMUR; NSI PELVIS
233		0233	P			X		I		4B	
234		0234	NS					NS	NS	NS	
235		0235	G				X	A	NO	4B	OA LEFT MT1
236		0236	A	X				C		1	ABNORMAL POROSITY OCCIPITAL; L CO
237		0237	G			X		A	NO	4B	
238		0238	G				X	A	NO	4B	
239		0239	P	X				MA	M	4B	SJD; OA LEFT HIP, ANKLES; ENTHESOPATHY PELVIS, LEFT FIBULA, BOTH CALCANEI, RIGHT PATELLA, BOTH TIBIAE, BONE GROWTH RIGHT SACROILIAC JOINT; DJD FOOT
240		0240	G	X				YA	M	4B	DENTAL DISEASE; DIFFUSE PERIOSTITIS ACCROSS SKELETON; PULMOARY TB?
241		0241	A			X		A	NO	4B	
242		0242	P				X	A	F	4B	
243		0243	G	X				YA	M	4B	NSI HUMERUS, RADIUS, ULNA; TIBIA; FIBULA, HANDS, PLEURAL SURFACE LEFT RIBS2-7; POSSIBLE CIST RIGHT FEMUR; OA LEFT FOOT; POSSIBLE KIDNEY STONES; SN; DENTAL DISEASE
244		0244	G	X				YA	F	4B	DENTAL DISEASE; OP T5,6 AND 12
245		0245	A		X			A	F	4B	OP RIGHT KNEE AND CALCANEUS; RIGHT TIBIA/FIBULA ENTHESOPATHY; CONCENTRIC REMODELLING 5TH PROXIMAL FOOT PHALANGE; DENTAL DISEASE

246		0246	G	X				MA	?F	4B	DENTAL DISEASE; OA BOTH SHOULDERS, HANDS; SJD; HEALED RIB FRACTURES; HEALED RICKETS; ENTHESOPATHIES BOTH CLAVICLES, RADII, PATELLAE, CALCANEI AND RIGHT TIBIA
247		0247	G	X				YA	M	4B	SACRALISATION L6; DENTAL DISEASE; SJD;SN
248		0248	P			X		A	NO	4B	ENTHESOPATHIES BOTH PATELLAE AND CALCANEI; BONY GROWTH LEFT MT1
249		0249	A			X		A	NO	4B	ENTHESOPATHY LEFT TIBIA
250		0250	EQ					EQ	EQ	EQ	
251		0251	P			X		A	NO	4B	DJD RIGHT ANKLE, BOTH FEET; POSSIBLE RA FEET; NSI RIGHT TIBIA, LEFT FIBULA AND LEFT FOOT
252		0252	P				X	A	NO	4B	
253		0253	G				X	I		4B	
254		0254	A			X		I		4B	RICKETS
255		0255	A			X		C		4B	
256		0256	G	X				YA	F	4B	DENTAL DISEASE
257		0257	A				X	I		4B	?SCURVY
258		0258	A			X		MA	?F	4B	OSTEOMYELITIS LEFT CALCANEUS
259		0259	P			X		I		4B	SCURVY
260		0260	G	X				I		4B	CO;NSI RIB
261		0261	G				X	PERI		4B	
262		0262	P			X		A	NO	4B	DENTAL DISEASE;HEALED RICKETS BOTH TIBIAE;NSI RIGHT FIBULA
263		0263	G	X				MA	F	4B?	DENTAL DISEASE;BILATERAL MAXILLARY SINUSITIS; NSI RIGHT ORBIT AND FRONTAL; SJD; OA RIGHT ELBOW, HAND, KNEES, SHOULDERS AND LEFT FOOT; ENTHESOPATHIES BOTH HUMERI, FEMORAE, PATELLAE AND CALCANEI.; SPONDYLOLYSIS L5
264		0264	A		X			C		4B	
265		0265	P			X		A	?F	4B	
266		0266	G	X				PERI		1	
267		0267	A		X			F		1	
268		0268	G				X	I		1	BILATERAL CO

269		0269	G		X			I		1	
270		0270	G	X				I		1	
271		0271	G	X				I		1	
272		0272	G	X				A	NO	4B	DENTAL DISEASE; SN; BILATERAL CONGENITAL HIP DISLOCATION; 2DRY OA HIP; ASSYMETRY FEMORAE
273		0273	G	X				A	M	4B	OSTEOMYELITIS RIGHT FEMUR; NSI RIGHT TIBIA AND BOTH FIBULAE; ENTHESOPATHY LEFT FEMUR; BOTH PATELLAE AND BOTH CALCANEI; 2DRY DJD RIGHT KNEE; DENTAL DISEASE
274		0274	A	X				MA	?F	4B	OSSIFICATION LEFT FEMORAL HEAD LIGAMENT POSSIBLE AS A RESULT OF TRAUMA; ENTHESOPATHY RIGHT TIBIA; BILATERAL MAXILLARY SINUSITIS; SN
275		0275	A				X	C		4B	OSTEITIS;DENTAL DISEASE; CONGENITAL SYPHILIS?
276		0276	G	X				PERI		1	
277		0277	A	X				A	M	4B	BUTTOM OSTEOMA RIGHT PARIETAL; ENTHESOPATHIES CLAVICLES, PELVIS, FEMORAE, TIBIAE, CALCANEI AND PATELLAE; POSSIBLE DISH OR SPODYLOARTHROPATHY; POSSIBLE MYOSSITIS OSSIFICANS RIGHT TIBIA/FIBULA; DJD SHOULDERS, TIBIA/FIBULA, FEET, HANDS;SJD
278		0278	P				X	OA	?F	4B	SJD
279		0279	G	X				C		1	
280		0280	G	X				C		4B	
281		0281	G				X	A	NO	4B	
282		0282	A				X	NON A		1	
283		0283	A				X	C		2-3	
284		0284	G			X		YA	F	4B	HYPOPHOSPHATEMIC OMAL
285		0285	G	X				I		1	
286		0286	G	X				I		1	SCURVY
287		0287	A		X			I		1	RICKETS/SCURVY
288		0288	G	X				I		1	DENTAL DISEASE
289		0289	P	X				YA	?M	2	SFT

290		0290	G	X				I		3A	
291		0291	G	X				I		1	
292		0292	P				X	I		2	
293		0293	P	X				A	NO	4B	PERIOSTITIS TIBIA AND FIBULA AND BOTH CALCANEUS ; POSSIBLE RA FOOT; FUSION INTERMEDIATE AND DISTAL LEFT 5TH MT PHALANGE; ADDITIONAL ARTICULAR SURFACE RIGHT MT1
294		0294	G	X				MA	F	4B	SCOLIOSIS OF THORACIC SPINE; DENTAL DISEASE; BOWING OF HUMERI
295		0295	P			X		C		4B	BILATERAL PERIOSTITIS TIBIAE
296		0296	P			X		YA	?M	1	
297		0297	NS					NS	NS	NS	
298		0298	A			X		MA	?M	4B	SPODYLARTHROPATHY POSSIBLE REITERS SYNDROME AT LEFT FOOT
299		0299	G	X				C		1	
300		0300	A			X		I		1	SCURVY
301		0301	P			X		A	NO	4B	OP DISTAL FEMORAE
302		0302	G	X				I		1	BILATERAL MAXILLARY SINUSITIS
303		0303	A			X		I		1	
304		0304	G				X	C		4B	
305		0305	G	X				C		3A	BILATERAL MAXILLARY SINUSITIS; NSI RIGHT FEMUR; HEALED RICKETS
306		0306	P			X		C		1	BILATERAL MAXILLLARY SINUSITIS
307		0307	G	X				I		3A	SCURVY
308		0308	G	X				MA	M	4B	DENTAL DISEASE; DJD SHOULDER; SN; SJD; SACRALISATION COX 1; ENTHESOPATHIES PELVIS, FEMORAE. PATELLA, TIBIA, FIBULA, CALCANEUS; POSSIBLE OSTEOMA LEFT MYLOHYOID BRIDGE
309		0309	G	X				C		3A	BILATERAL CO
310		0310	G	X				I		3A	PITTING LEFT MAXILLA AND AROUND MOLAR CRYPTS ALSO ON PALATE;?RICKETS
311		0311	G	X				I		3A	BILATERAL CO; MAXILLARY SINUSITIS
312		0312	G		X			I		3A	

313		0313	G	X				MA	?M	3A	DENTAL DISEASE; SN;DISK HERNIA T12 AND L2;SPINA BIFIDA
314		0314	A				X	A	F	3A	DJD LEFT TEMPOROMANDIBULAR JOINT, RIGHT SHOULDER, RIGHT ELBOW; SJD; DENTAL DISEASE
315		0315	G		X			I		3A	POSSIBLE SCURVY
316		0316	G	X				C		3A	BILATERAL CO
317		0317	G				X	MA	F	1-3	DJD HAND, FOOT; POSSIBLE AS OR DISH; ENTHESOPATHY ON ILIUM
318		0318	A			X		A	M	1-3	DJD RIGHT SHOULDER
319		0319	G	X				MA	F	3A	THINNING OF BONE ON BOTH SCAPULAE; SJD; DJD MT1, FOOT, RIGHT WRIST; ENTHESOPATHY PATELLA AND CALCANEUS; DENTAL DISEASE
320		0320	G				X	A	NO	4B	
321		0321	A			X		AD		4B	NSI FEMORAE, TIBIAE, FIBULAE AND FEET, RIGHT HAND, RADIUS AND ULNA; FUSION 5TH MT PHALANGES
322		0322	G	X				C		4B	POSSIBLE SCURVY; DENTAL DISEASE; COX1 SACRALISATION; FUSION OF PHALANGES 2 AND 5 MT; CO
323		0323	G				X	A	NO	4B	FUSION OF 5TH INTERMIDIATE AND DISTAL PHALANGE LEFT FOOT; OP RIGHT SESAMOID
324		0324	P			X		A	?M	NP	DENTAL DISEASE; SJD; DJD COSTOVERTEBRAL AND RIGHT ELBOW; HEALED FRACTURES ON 4 RIBS; POSSIBLE DISTAL ARTICULAR FRACTURE AT RIGHT CAPITULUM; COMPRESSION FRACTURES ON 6 VERTEBRAL BODIES; FUSION OF 2 THORACIC VERTEBRAE;OSSIFICATION AT LOGITUDINAL LIGAMENT
325		0325	A			X		I		NP	SCURVY
326		0326	G				X	A	F	4B	
327		0327	A				X	A	NO	NP	OA RIGHT ELBOW; OSSIFIED CARTILAGE ON RIBS
328		0328	A				X	A	NO	NP	HEALED FRACTURE 3RD LEFT PROXIMAL FOOT PHALANGE; ENTHESOPATHY RIGHT TIBIA; RIGHT FIBULA AND CALCANEUS

329		0329	A				X	A	NO	4B	
330		0330	G	X				MA	?F	3B	SJD; SN;SACRALISATION COX1 AND 2;MYOSSITIS OSSIFICANS TRAUMATICA LEFT TIBIA AND FIBULA; ENTHESOPATHIES BOHT CALCANEI; OA SHOULDER
331		0331	G				X	A	NO	1-2	
332		0332	A				X	C		1-2	
333		0333	A	X				C		4B	DENTAL DISEASE
334		0334	G			X		PERI		4B	
335		0335	G				X	I		4B	
336		0336	P			X		MA	F	4B	OSTEOCHONDROMA LEFT FEMUR
337		0337	G	X				MA	F	4B	HEALED DEPRESSED SKULL FRACTURE; OA SHOULDERS, HAND, FOOT; SJD; TB SPINE; DJD RIBS; FUSED COX; ENTHESOPATHIES FEMORAE, LEFT FIBULA ,CALCANEUS; FUSION INTERMIDIATE AND DISTAL 5TH MT PHALANGE;ASSIMETRY ON LEFT AURICULAR SURFACE
338		0338	G	X				C		4B	CO LEFT ORBIT; FUSION RIBS 1 AND 2; NSI LEFT FEMUR
339		0339	NS					NS	NS	NS	
340		0340	G	X				C		4B	HEALED RICKETS; DENTAL DISEASE
341		0341	G	X				PERI		2-4	CO
342		0342	G	X				C		2-4	BILATERAL CO; POROSITY ON TIBIAE, FIBULAE AND LEFT FEMUR METAPHYSIS ENDS
343		0343	G		X			C		2-4	
344		0344	A				X	I		2-4	
345		0345	G	X				C		2-4	
346		0346	G	X				I		2-4	
347		0347	G				X	I		3A	
348		0348	G	X				C		3A	ENTHESOPATHY LEFT HUMERUS AND RIGHT TIBIA
349		0349	G	X				C		3A	CO
350		0350	G			X		I		2-4	
351		0351	G				X	C		2-4	
352		0352	G				X	C		2-4	

353		0353	G	X				PERI		2-4	
354		0354	G		X			C		2-4	
355		0355	A	X				AD	?F	4B	PERIOSTITIS, BILATERAL ON APPENDICULAR SKELETON
356		0356	A		X			MA	M	2-4	SJD; DJD LEFT ELBOW, BOTH KNEES;NSI TIBIAE AND FIBULAE; ?HEALED RICKETS; ENTHESOPATHY LEFT PATELLA AND BOTH CALCANEI
357		0357	G	X				AD		2-4	BILATERAL CO; POSSIBLE KLIPPEL FEIL; TRAUMA; POROSITY DISTAL METAPHYSIS LEFT FEMUR
358		0358	A		X			OA	F	3A	HEALED FRACTURE LEFT FEMUR; 2DRY OA BOTH HIPS, ELBOWS; POSSIBLE HEALED FRACTURE LEFT 5TH PHALANGE; POSSIBLE IMPACT FRACTURE 5TH RGIHT PROXIMAL PHALANGE; DJD BOTH PATELLAE; RIGHT KNEE, FEET; ENTHESOPATHIES CALCANEI;SJD;SN; SPONDYLOLYSIS L4
359		0359	G	X				MA	M	4B	DENTAL DISEASE; HEALED FRACTURE RIGHT RIB; SACRALISATION COX1; ENTHESOPATHY RIGHT RIBS
360		0360	A	X				MA	F	2-4	DENTAL DISEASE; ETHMOIDAL SINUSITIS; OA BOTH SHOULDERS, RIGHT HAND, LEFT KNEE, LEFT FOOT; NSI LEFT RIBS; ENTHESOPATHIES BOTH ULNAE, PATELLAE AND LEFT FIBULA; POSSIBLE HEALED RICKETS; SJD; ABNORMAL POROSITY 5MT
361		0361	A				X	I		4B	BOWING ON BOTH FIBULAE
362		0362	A	X				I		2-4	
363		0363	G	X				C		2-4	CO
364		0364	A		X			I		2-4	
365		0365	G		X			MA	F	2-4	CERVICAL RIBS; SN; SJD; SPINA BIFIDA
366		0366	G	X				C		2-4	BILATERAL CO;BILATERAL MAXILLARY SINUSITIS; ENTHESOPATHY LEFT HUMERUS AND RIGHT TIBIA;DENTAL DISEASE

367		0367	G	X				MA	M	3A	DENTAL DISEASE; CO LEFT SIDE; OA SPINE; COMPRESSION L5; DJD RIGHT WRIST; ENTHESOPATHY RIGHT FEMUR
368		0368	G	X				MA	?F	2-4	DENTAL DISEASE; SN; DJD COSTOVERTEBRAL JOINT;SACRALISATION COX1; ENTHESOPATHIES BOTH CALCANEI
369		0369	G		X			I		3A	ENTHESOPATHY RIGHT HUMERUS; RICKETS
370		0370	G				X	C		3A	
371		0371	G	X				MA	M	2-3	OA BOTH SHOULDERS, ELBOWS AND HANDS; SJD; HEALED FRACTURES RIGHT AND LEFT RIBS; DENTAL DISEASE; ENTHESOPATHY LEFT PATELLA; HEALED AND UNHEALED FRACTURES AT RIBS
372		0372	G				X	F		4B	
373		0373	A				X	C		4B	
374		0374	G		X			YA	M	4B	ENTHESOPATHY RIGHT HUMERUS, PATELLA AND TIBIA; SN
375		0375	G	X				MA	M	4B	BILATERAL CO; DENTAL DISEASE; SJD; DJD SHOULDER, FEET; ENTHESOPATHY RIGHT CLAVICLE, PATELLA AND BOTH PELVISES; POSSIBLE DISH L3-4
376		0376	G	X				MA	F	4B	ENDOCRANIAL WOVEN BONE AT OCCIPITAL AND PARIETAL; BILATERAL CO; BILATERAL MAXILLARY SINUSITIS; DENTAL DISEASE; SJD; DJD ELBOWS, HAND, WRIST; HEALED RICKETS; ENTHESOPATHY RIGHT PATELLA, TIBIA, BOTH CALCANEI
377		0377	G	X				I		4A	
378		0378	G				X	A	NO	4B	
379		0379	G	X				I		4B	
380		0380	G			X		C		4B	BILATERAL CO; DENTAL DISEASE;NSI LEFT RIBS
381		0381	G	X				C		2-3	BILATERAL CO; BILATERAL MAXILLARY SINUSITIS; ENTHESOPATHIES BOTH HUMERI; TRANSITIONAL VERTEBRA T13 AND LUMBARISATION OF S1; MYOSITIS OSSIFICANS TRAUMATICA MC1 RIGHT PROXIMAL PHALANGE; DENTAL DISEASE

382		0382	G				X	C		2-4	
383		0383	G			X		MA	F	2-4	DJD HAND, RIB, KNEE, LEFT MT1; OA RIGHT MT1; WELL HEALED TIBIA FRACTURE; CALCANEUS ENTHESOPATHY; ADDITIONAL ARTICULAR SURFACE 1ST MT
384		0384	G	X				OA	F	3A	DJD SHOULDER; HANDS; SJD; DENTAL DISEASE; SN; 'CLAW HAND DEFORMITY' RIGHT PROXIMAL 3 AND 5 PHALANGES
385		0385	G	X				MA	M	3A	HEALED DEPRESSED SKULL FRACTURE; DJD RIGHT SHOULDER, RIBS, LEFT MT1 AND FEET; ENTHESOPATHY BOTH ULNAE, RIGHT PELVIS, RIGHT PATELLA, BOTH TIBIAE, FIBULAE AND CALCANEI; DENTAL DISEASE; HALLAX VULGUS; SJD; SN
386		0386	A				X	I		4B	
387		0387	G	X				OA	M	2-3	DENTAL DISEASE;SJD;LEFT RADIUS DISPLACED FRACTURE;PERIOSTITIS RIGHT TIBIA AND FEMUR
388		0388	G	X				YA	F	2-4	DENTAL DISEASE; BILATERAL ENTHESOPATHIES BOTH HUMERI
389		0389	G				X	C		2-4	NSI LEFT FEMUR
390		0390	A	X				A	?F	2-4	DENTAL DISEASE; HEALED RICKETS; FUSION RIGHT INTERMEDIATE AND DISTAL FOOT PHALANGES
391		0391	G			X		I		3A	
392		0392	G	X				I		4B	
393		0393	G				X	A	F	4B	NSI RIGHT TIBIA
394		0394	G			X		YA	M	2-4	DJD SPINE; SN; ENTHESOPATHY LEFT RADIUS
395		0395	G		X			YA	F	4B	DENTAL DISEASE; SN; SJD; HEALED LEFT RIB FRACTURES
396		0396	G	X				MA	F	4B	DENTAL DISEASE; DJD SHOULDER, HAND; SJD; CHRONIC NSI ON RIGHT RIBS
397		0397	G			X		C		2-4	ENTHESOPATHY LEFT TIBIA
398		0398	G	X				PERI		4B	?SCURVY
399		0399	G		X			PERI		4B	
400		0400	G			X		I		2-4	

401		0401	G				X	AD		2-4	DENTAL DISEASE; ENTHESOPATHY CLAVICLE AND HUMERUS
402		0402	G				X	A	M	2-4	CO; MAXILLARY SINUSITIS; DENTAL DISEASE
403		0403	G		X			I		3A	SOME ROUGHENING ON DELTOID TUBEROSITY
404		0404	A			X		MA	?M	2-4	SJD
405		0405	G		X			PERI		3A	
406		0406	G				X	I		2-3	
407		0407	A		X			C		4B	BILATERAL CO; BILATERAL MAXILLARY SINUSITIS
408		0408	G		X			C		2-4	
409		0409	G	X				YA	F	2-4	DENTAL DISEASE; BILATERAL MAXILLARY SINUSITIS; SJD; OA RIGHT SHOULDER; NSI LEFT CLAVICLE; HEALED RIB FRACTURES; SPONDYLOLYSIS L5
410		0410	A			X		I		3A	
411		0411	G	X				C		2-3	
412		0412	EQ					EQ	EQ	EQ	OA RIGHT SHOULDER, RIGHT ELBOW, HAND; HEALED FRACTURE RIGTH RIB; DJD COSTOVERTEBRAL JOINTS; SJD;DISH;ENTHESOPATHY RIGHT PELVIS AND FEMUR; HEALED FRACTURE RIGHT PATELLA; BONY BRIDGE SACROILIAC JOINT
413		0413	A		X			MA	?M	2-3	DENTAL DISEASE;SJD; POSTERIOR TORSION OF BOTH HUMERAL HEADS; ENTHESOPATHIES BOTH CLAVICLES
414		0414	G	X				I		3A	
415		0415	G			X		C		3A	RIGHT MAXILLARY SINUSITIS
416		0416	G				X	A	NO	2-3	ENTHESOPATHIES LEFT CALCANEUS, OP LEFT CALCANEUS AND RIGHT NAVICULAR; DJD RIGHT FOOT;POSSIBLE DEVELOPMENT DEFECT ON LEFT 1MTT AND PROXIMAL PHALANGE
417		0417	A			X		MA	M	2-3	HEALED RICKETS; SACRALISATION L5; COMPRESSION FRACTURE L1, L2; SJD 2DRY TO FRACTURE
418		0418	P				X	I		4B	

419		0419	G	X				C		4B	BILATERAL CO
420		0420	A				X	I		2-4	
421		0421	A				X	C		2-4	
422		0422	G				X	I		4B	
423		0423	G				X	A	?F	2-4	
424		0424	A	X				I		2-4	
425		0425	EQ					EQ	EQ	EQ	
426		0426	NS					NS	NS	NS	
427		0427	G				X	A	NO	1-3	FOOT DJD; FUSION 5TH LEFT MT INTERMIDIATE AND DISTAL PHALANGES
428		0428	G	X				YA	F	3A	DENTAL DISEASE;BILATERAL ENTHESOPATHY CLAVICLES; SN; HEALED RICKETS LEFT ULNA AND RADIUS;NSI LEFT TIBIA
429		0429	A	X				I		2-4	?SCURVY; HEALED RIB FRACTURE
430		0430	G	X				I		3A	BILATERAL ENTHESOPATHY BOTH HUMERI
431		0431	A				X	C		4B	
432		0432	A	X				MA	F	2-4	DENTAL DISEASE; LEFT MAXILLARY SINUSITIS; ENTHESOPATHY BOTH CLAVICLES AND RIGHT FIBULA; SJD; SPONDYLOLYSIS L4?OR L5?
433		0433	A			X		YA	M	2-3	POSSIBLE OSSIFICATION OF LIGAMENT ON LEFT 5MT
434		0434	G				X	A	NO	2-4	ENTHESOPATHY LEFT TIBIA
435		0435	A				X	AD		2-4	
436		0436	G	X				MA	?M	3A	DENTAL DISEASE; BILATERAL MAXILLARY SINUSITIS; SJD;COMPRESSION FRACTURE L5; CONGENITAL GROWTH PROBLEM AT LEFT HUMERUS; ENTHESOPATHY LEFT PATELLA
437		0437	G			X		A	M		MAXILLARY SINUSITIS; DJD RIGHT SHOULDER, ELBOW; SJD; ENTHESOPATHY RIGHT HUMERUS; BILATERAL CERVICAL RIBS;DENTAL DISEASE
438		0438	G	X				YA	F	3A	DENTAL DISEASE; SPONDYLOLYSIS L5; SN; PULMONARY DISEASE - PERIOSTITIS RIGHT RIBS; ENTHESOPATHY LEFT CUNEIFORM; FUSION OF UNIDENTIFIED 4 OR 5MT PHALANGES

439		0439	G	X				MA	F	2-3	ENTHESOPATHY ON CALCANEI, RIGHT HUMERUS; POSSIBLE REMODELLING 5TH DISTAL PHALANGE;DENTAL DISEASE; SJD;DJD RIGHT SHOULDER, FOOT; TRAUMA RELATED ANKYLOSIS OF INTERMEDIATE AND DISTAL RIGHT 4TH MTC PHALANGE
440		0440	G				X	A	?F	2-4	HEALED FRACTURE LEFT ULNA
441		0441	G	X				MA	?M	2-3	DENTAL DISEASE; BILATERAL MAXILLARY SINUSITIS; EROSIVE LESIONS LEFT LACRIMAL - ?SINUSITIS 2RY ETHMOIDAL AND FRONTAL SINUSITIS
442		0442	A				X	I		1-2	
443		0443	G			X		YA	?M		
444		0444	G				X	YA	?F	2-3	
445		0445	G		X			YA	M	2-3	DENTAL DISEASE; ENTHESOPATHY BOTH CLAVICLES, LEFT HUMERUS; SN; SPINA BIFIDA S1
446		0446	G			X		C		2-3	
447		0447	G	X				YA	F	2-3	DENTAL DISEASE;LEFT ENTHESOPATHY BOTH HUMERI; SN
448		0448	G			X		C		2-4	DENTAL DISEASE
449		0449	G	X				MA	M	2-3	DENTAL DISEASE; RIGHT MAXILLARY SINUSITIS; ENTHESOPATHY BOTH PATELLAE, LEFT TIBIA AND CALCANEI
450		0450	G	X				AD	?M	3A	BILATERAL CO; LYTIC SKULL LESIONS; SACRALISATION OF L6; BOWING BOTH TIBIAE
451		0451	G	X				I		2-3	
452		0452	G			X		YA	M	2-3	ENTHESOPATHY LEFT HUMERUS; SJD; SN
453		0453	G		X			AD		3A	
454		0454	G		X			I		3A	RICKETS?SCURVY?;CORTICAL DEFECTS BOTH HUMERUS
455		0455	G				X	C		2-3	DENTAL DISEASE
456		0456	G	X				I		2-3	BILATERAL CO; BILATERAL MAXILLARY SINUSITIS; NSI RIGHT ZYGOMATIC; DENTAL DISEASE
457		0457	G	X				C		2-3	BILATERAL MAXILLARY SINUSITIS

458		0458	G	X				C		2-3	RIGHT CO; CONGENITAL ABSCENCE OF T12?
459		0459	G	X				MA	M	4B	OA SHOULDER, ELBOWS,KNEES; SJD; ENTHESOPATHY RIGHT HUMERUS, LEFT FEMUR, RIGHT PATELLA, LEFT TIBIA, RIGHT CALCANEUS; SN; MELORHEOSTOSIS RIGHT FEMUR, TIBIA AND FIBULA;SACRALIZATION 1COX
460		0460	G			X		I		2-3	
461		0461	G	X				MA	F	2-3	BILATERAL CO; DENTAL DISEASE; ENTHESOPATHY RIGHT CLAVICLE; DJD RIGHT COSTOVERTEBRAL JOINT
462		0462	G			X		A	M	2-3	OA RIB; HEALED FRACTURE RIGHT RIB; ENTHESOPATHY RIGHT ULNA; DENTAL DISEASE
463		0463	A	X				YA	M	2-3	BILATERAL CO; DENTAL DISEASE; ENTHESOPATHY LEFT CLAVICLE; SJD; SN
464		0464	G			X		I		2-4	
465		0465	A			X		MA	?F		DJD LEFT RIB AND ELBOW ;SN;OA LEFT WRIST; ABCESS LEFT AURICULAR SURFACE; ENTHESOPATHY LEFT PATELLA AND LEFT PUBIS
466		0466	G				X	I		2-4	
467		0467	G		X			MA	F	2-3	DENTAL DISEASE; ENTHESOPATHY RIGHT PATELLA
468		0468	A			X		MA	M	4B	SN; DEGENERATIVE CHANGES RIGHT MC3
469		0469	G				X	A	NO	2-4	ENTHESOPATHIES BOTH CALCANEI; FUSION INTERMEDIATE AND DISTAL 4 OR 5TH MT PHALANGES
470		0470	G	X				MA	F	3A	DENTAL DISEASE; OCCIPITAL BUN; SPINA BIFIDA ATLANTA; DJD ELBOWS; ENTHESOPATHY BOHT FEMORAE;SJD; OSTEOPENIA
471		0471	G				X	C		3A	CO; DENTAL DISEASE
472		0472	A		X			I		2-3	
473		0473	G			X		I		3A	
474		0474	G		X			YA	F	3A	ENTHESOPATHY RIGHT HUMERUS, RIGHT PATELLA
475		0475	G			X		C		3A	BILATERAL CO; NSI OCCIPITAL

476		0476	G	X				MA	F	3A	DENTAL DISEASE; SJD; OA RIGHT ELBOW AND FOOT; SN; ENTHESOPATHY RIGHT HUMERUS, LEFT FEMUR AND CALCANEUS
477		0477	A				X	MA	M	3A	DJD RIGHT SHOULDER AND ELBOW; ENTHESOPATHY ON HUMERUS
478		0478	G	X				MA	M	3A	DENTAL DISEASE; SACRALISATION; SJD; DJD SHOULDER, ELBOW, LEFT HAND AND LEFT RIB AND HUMERUS, ENTHESOPATHY RIGHT FEMUR AND BOTH HUMERI; OMAL
479		0479	G				X	A	NO	3A	ENTHESOPATHIES RIGHT PATELLA, CALCANEUS AND FIBULA; POSSIBLE OSTEOCHONDRITIS DISSECANS; DJD RIGHT KNEE AND ANKLE
480		0480	G	X				F		3A	
481		0481	ND					ND	ND	ND	
482		0482	G			X		C		3A	SPINA BIFIDA T11
483		0483	G	X				C		2-3	DENTAL DISEASE;BILATERAL CO; LEFT MAXILLARY SINUSITIS; ENTHESOPATHY BOTH HUMERI AND TIBIA
484		0484	G		X			YA	?M	4B	SN; ENTHESOPATHY RIGHT HUMERUS
485		0485	G	X				MA	F	4B	DENTAL DISEASE; DJD RIGHT SHOULDER;SJD; HEALED FRACTURE LEFT 5MTT PROXIMAL PHALANGE; MISSING OSSICLE ON RIGHT CALCANEUS; SN
486		0486	A				X	A	NO	4B	LAMELLAR BONE LEFT TIBIA
487		0487	A				X	A	NO	3A	DENTAL DISEASE; ATLAS DEFECT
488		0488	A				X	A	F	3-4?	HEALED PERIOSTEAL LESION
489		0489	G	X				C		3	
490		0490	P				X	I		2-3	
491		0491	A				X	AD		3-4?	
492		0492	A			X		AD	?F	4B	DENTAL DISEASE; LEFT CO
493		0493	G			X		I		3A	
494		0494	G		X			PERI		4B	NSI RIGHT ULNA
495		0495	NS					NS	NS	NS	

496		0496	G	X				MA	M	3A	DENTAL DISEASE; BILATERAL MAXILLARY SINUSITIS; OA SHOULDER; SJD; DISH; NSI RIGHT FIBULA; ENTHESOPATHY BOTH CLAVICLES, ULNA, RADII,PELVIS,FEMURS,PATELLA
497		0497	ND					ND	ND	ND	
498		0498	A	X				I		2-3	RICKETS
499		0499	A			X		A	F	4B	NSI TIBIA; ?MT5 INTERMEDIATE AND DISTAL PHALANGES FUSED
500		0500	G	X				PERI		3A	
501		0501	G		X			YA	M	2-3	SN
502		0502	G	X				C		2-3	DENTAL DISEASE;LEFT MAXILLARY SINUSITIS
503		0503	G				X	C		3A	ENTHESOPATHY RIGHT TIBIA
504		0504	G			X		YA	M	2-3	ENTHESOPATHY LEFT TIBIA; NSI LEFT TIBIA AND FIBULA
505		0505	G	X				YA	F	2-3	MAXILLARY SINUSITIS; DENTAL DISEASE; SJD T1 AND T2; FUSION OF PHALANGES 4 OR 5MT
506		0506	NS					NS	NS	NS	
507		0507	A	X				A	?F	4B	DENTAL DISEASE; BILATERAL MAXILLARY SINUSITIS; RIB FRACTURES; MULTIPLE MYELOMA
508		0508	G				X	I		2-3	
509		0509	G				X	AD		2-3	
510		0510	EQ					EQ	EQ	EQ	
511		0511	A	X				C		2-3	HEALED LEFT RIB FRACTURE; ENTHESOPATHIES CLAVICLES, RIGHT HUMERUS
512		0512	G		X			MA	F	2-3	DENTAL DISEASE;HEALED DEPRESSED FRACTURE LEFT PARIETAL; SJD; SN; NON UNION OF STYLOID PROCESS OF RIGHT ULNA
513		0513	A	X				MA	F	2-3	DENTAL DISEASE;BILATEAL MAXILLARY SINUSITIS; ENTHESOPATHIES BOTH HUMERI; SN; SPONDYLOLYSIS L4;TRAUMATIC DISC HERNIATION L5
514		0514	ND					ND	ND	ND	MAXILLARY SINUSITIS, NSI TEMPORAL, ENDOCRANIAL LESIONS
515		0515	A	X				AD	?M	2-3	

516		0516	G				X	A	F	2-3	
517		0517	A		X			MA	M	2-3	SJD
518		0518	EQ					EQ	EQ	EQ	
519		0519	A	X				I		2-4	
520		0520	G				X	I		4B	
521		0521	A				X	I		4B	
522		0522	NS					NS	NS	NS	
523		0523	G			X		I		2-3	
524		0524	G				X	A	NO	2-3	REMODELLED LAMELLAR BONE BOTH TIBIAE; POSSIBLE OSSICLE FUSED TO LEFT CUBOID;CORTICAL BONE LEFT FIBULA
525		0525	G				X	I		4B	
526		0526	G	X				MA	M	2-3	DENTAL DISEASE; BILATERAL CO; BILATERAL MAXILLARY SINUSITIS; DJD SHOULDER; SJD; OA FINGER; SN; HEALED RIB FRACTURES; ENTHESOPATHY MANUBRIUM, LEFT CLAVICLE, RIGHT HUMERUS, RADII, LEFT PELVIS, FEMORAE, PATELLAE, CALCANEI
527		0527	G	X				C		2-3	
528		0528	G			X		PERI		2-3	
529		0529	G	X				MA	F	3A	DENTAL DISEASE; SJD; OA SHOULDERS,WRISTS AND HANDS; SN; SPINA BIFIDA; ENTHESOPATHY RIGHT HUMERUS AND PATELLA; POSSIBLE PA
530		0530	A			X		MA	F	2-3	OA SPINE, COSTOVERTEBRAL AND LEFT SHOULDER
531		0531	G			X		MA	F	2-3	OA RIGHT WRIST, HAND AND FOOT AND BOTH KNEES; ENTHESOPATHY RIGHT PELVIS
532		0532	G	X				F		4B	
533		0533	A		X			C		4B	
534		0534	A			X		I		4B	
535		0535	G		X			I		3A	
536		0536	G		X			YA	M	2-3	ENTHESOPATHY RIGHT HUMERUS, LEFT TIBIA; SJD; SN;SACRALISATION L5
537		0537	A				X	AD		4B	

538	A	0538A	G				X	C		4B	
538	B	0538B	P				X	I		4B	
539		0539	A	X				I		2-3	
540		0540	G				X	A	NO	2-3	DJD 1ST PROXIMAL FOOT PHALANGE
541		0541	A			X		I		2-3	
542		0542	G				X	PERI		4B	
543		0543	A			X		A	F	2-3	BILATERAL CO;DENTAL DISEASE
544		0544	A		X			MA	F	2-3	DENTAL DISEASE; RIGHT CO; POROTIC HYPEROSTOSIS; RIGHT MAXILLARY SINUSITIS; FUSION OF T2-4 CAUSING SLIGHT SCOLIOSIS; SN; EROSIVE LESIONS T7,L3; TRAUMATIC ANTERIOR DISC HERNIATION; SACRALISATION COX 1
545		0545	A				X	C		2-3	
546		0546	G		X			C		3A	BILATERAL CO
547		0547	EQ					EQ	EQ	EQ	
548		0548	G	X				YA	F	2-3	SJD; OA SHOULDER, SPONDYLOLYSIS L5; ENTHESOPATHY RIGHT HUMERUS AND BOTH PELVIS
549		0549	G				X	PERI		4B	
550		0550	A		X			A	M	3A	SJD T8-9;NSI PLEURAL RIBS; ENTHESOPATHY BOTH HUMERI AND LEFT CLAVICLE
551		0551	G	X				MA	F	2-3	SN; SJD
552		0552	G	X				I		2-3	
553		0553	A	X				MA	F	3A	HEALED FRACTURE RIGHT ULNA; SJD
554		0554	G			X		MA	M	2-3	BILATERAL ENTHESOPATHY BOTH PATELLAE AND CALCANEI
555		0555	G				X	C		4B	
556		0556	G		X			AD		3A	BILATERAL CO; BILATERAL MAXILLARY SINUSITIS; ENTHESOPATHY RIGHT CLAVICLE; SN; SPINA BIFIDA OCCULTA
557		0557	A		X			C		2-3	
558		0558	A			X		MA	M	4B	DJD LEFT SHOULDER
559		0559	G			X		YA	F	2-3	SJD CERVICAL; DJD COSTOVERTEBRAL JOINTS;DENTAL DISEASE

560		0560	G	X				C		2-3	NSI LEFT SCAPULA, RIGHT FEMUR; RICKETS
561		0561	G	X				C		4B	DENTAL DISEASE
562		0562	NS					NS	NS	NS	
563		0563	G			X		C		2-3	KLIPPEL-FEIL SYNDROME C2-3
564		0564	G	X				MA	F	2-3	DENTAL DISEASE; ENTHESOPATHY LEFT ULNA, PELVIS, FEMORAE; NSI LEFT FIBULA; SJD; 2 HEALED RIB FRACTURES; HEALED FRACTURE LEFT MAXILLA
565		0565	G	X				C		2-3	BILATERAL CO
566		0566	G		X			I		2-3	BILATERAL MAXILLARY SINUSITIS
567		0567	A		X			C		2-3	
568		0568	G			X		C		2-3	DENTAL DISEASE
569		0569	A		X			YA	F	4B	DJD SHOULDER; SJD; HEALED COLLES FRACTURE RIGHT RADIUS;2DRY OA ON RIGHT WRIST
570		0570	A	X				AD		2-3	BILATERAL MAXILLARY SINUSITIS; DENTAL DISEASE; ENTHESOPATHY RIGHT CLAVICLE AND RIGHT TIBIA
571		0571	A		X			AD		2-4	DENTAL DISEASE; ENTHESOPATHY RIGHT CLAVICLE AND HUMERUS
572		0572	G			X		OA	F	2-3	SJD;DJD RIGHT KNEE; SN; WELL HEALED FRACTURES BOTH MTC 5; NSI LEFT MTC 1; ENTHESOPATHY LEFT PELVIS AND FEMUR
573		0573	A			X		MA	M	2-3	ENTHESOPATHY RIGHT CLAVICLE; SJD; OA RIGHT HAND; SN; UNHEALED RIB FRACTURE; OSTEOMYELITIS RIGHT FEMUR
574		0574	G			X		C		1-3	
575		0575	G				X	A	NO	2-3	
576		0576	G	X				YA	?F	2-3	DENTAL DISEASE; SN; OSTEOCHONDRITIS DISSECANS RIGHT FEMUR; NSI LEFT TIBIA;POSSIBLE HERNIATION ON T12 AND L4
577		0577	G			X		C		2-3	DENTAL DISEASE
578		0578	G	X				C		2-3	BILATERAL MAXILLARY SINUSITIS

579		0579	G	X				YA	F	2-3	DENTAL DISEASE; RIGHT MAXILLARY SINUSITIS; CERVICAL RIBS; SJD; UNILATERAL SPONDYLOLYSIS L4; UNHEALED FRACTURE L4; ENTHESOPATHIES BOTH TIBIAE; BONY NODULE LEFT HUMERUS LATERAL CONDYLE
580		0580	G	X				C		2-3	
581		0581	G	X				YA	F	2-3	DENTAL DISEASE; RIGHT MAXILLARY SINUSITIS; ENTHESOPATHY RIGHT CLAVICLE, BOTH HUMERI, RIGHT FIBULA, RIGHT RADIUS, RIGHT ULNA, CALCANEUS; SJD; OA LEFT HAND, RIGHT FOOT; HEALED RIB FRACTURES; NSI RIGHT HUMERUS; SPINA BIFIDA; HEALED PARRY FRACTURE RIGHT ULNA
582		0582	A			X		C		3A	
583	A	0583A	G			X		I		2-3	
583	B	0583B	G			X		I		2-3	
584		0584	G				X	A	?F	2-3	SJD; SN; DISC HERNIATION T11
585		0585	G	X				MA	F	2-3	DENTAL DISEASE; DJD BOTH 1MTC; SJD;SPINA BIFIDA OCCULTA; HEALED RICKETS; ENTHESOPATHY ON CALCANEI
586		0586	A				X	A	NO	3A	
587		0587	G		X			I		2-3	
588		0588	A			X		PERI		2-3	
589		0589	A				X	A	M	4B	DENTAL DISEASE
590		0590	G	X				I		4B	SCURVY
591		0591	A			X		I		4B	
592		0592	G		X			C		2-3	
593		0593	G		X			PERI		1	
594		0594	G	X				C		4B	DENTAL DISEASE; BILATERAL MAXILLARY SINUSITIS
595		0595	G	X				MA	M	3A	DENTAL DISEASE; ENTHESOPATHIES BOTH CLAVICLES, ULNAE, RADII, PATELLAE; SJD; NSI RIGHT SCAPULA AND RIBS; 3 WELL HEALED LEFT RIB FRACTURES; DEPRESSIONS L3-5; SACRALISATION COX1; LEFT MAXILLARY

											SINUSITIS
596		0596	G		X			MA	?M	4B	DENTAL DISEASE; DJD LEFT SHOULDER AND ELBOW; SN; ENTHESOPATHY CLAVICLES AND RIGHT ULNA
597		0597	A		X			YA	F	4B	SACRALISATION L5, ASSYMMETRY BOTH FEMORAE, BONY GROWTH LEFT TALUS
598		0598	A		X			MA	?M	2-3	OA RIGHT SHOULDER, HAND; SJD; SN; SACRALISATION COX 1; ENTHESOPATHIES BOTH CALCANEI;DENTAL DISEASE
599		0599	A		X			A	M	3A	DENTAL DISEASE; OA TEMPOROMADIBULAR JOINT, SJD; HEALED RIGHT FACIAL FRACTURES AND LEFT RADIUS; SN
600		0600	G			X		C		2-3	
601		0601	G	X				YA	M	2-3	DENTAL DISEASE; METASTATIC CARCINOMA
602		0602	G	X				C		3A	BILATERAL MAXILLARY SINUSITIS;DENTAL DISEASE
603		0603	G			X		C		2-3	
604		0604	G	X				OA	?F	2-3	OPOR; DENTAL DISEASE; HEALED CLAVICLE FRACTURE; SJD; OA HANDS, RIGHT HIP, RIGHT SHOULDER,; ENTHESOPATHY RIGHT HUMEURS, BOTH CALCANEI
605		0605	G	X				MA	M	1-3	BILATERAL OTITIS; SJD; OA SHOULDERS, LEFT HAND, HIPS; HEALED RIB FRACTURES; SPONDYLOLYSIS L5; SACRALISATION COX1;ENTHESOPATHY PELVIS; T5-6 FUSED, T11-12 FUSED;EARLY DISH?
606		0606	G			X		YA	F	2-3	
607		0607	A			X		MA	F	2-3	DJD LEFT HUMERUS AND RIGHT 1ST PROXIMAL HAND PHALANGE
608		0608	A				X	A	NO	4B	
609		0609	P				X	C		4B	

610		0610	A	X				C		4B	BILATERAL MAXILLARY SINUSITIS
611		0611	G	X				AD		2-3	BILATERAL CO; BILATERAL MAXILLARY SINUSITIS; PERTHES OR CONGENITAL HIP DISLOCATION;ENTHESOPATHY TIBIA
612		0612	G	X				YA	M	2-3	BILATERAL MAXILLARY SINUSITIS;DENTAL DISEASE; SJD; LEFT INNOMINATE OSTEOMA/TRAUMA?
613		0613	G	X				MA	M	4B	CONGENITAL FUSION T2-3; SJD; SACRALISATION OF COX1; SPINA BIFIDA OCCULTA; ENTHESOPATHY LEFT PATELLA, LEFT TIBIA AND BOTH CALCANEI
614		0614	G				X	A	M	2-3	OA KNEE; ENTHESOPATHY PATELLAE, FIBULAE AND CALCANEI; NSI RIGHT TIBIA; HALLAX VULGUS
615		0615	G		X			AD		2-3	SN; DENTAL DISEASE
616		0616	A			X		A	M	4B	DENTAL DISEASE; ENTHESOPATHY LEFT HUMERUS; SN
617		0617	G		X			YA	M	2-3	DENTAL DISEASE; DJD RIBS; ENTHESOPATHY RIGHT CLAVICLE; OSSICLE LEFT RIBS
618		0618	G	X				C		2-3	DENTAL DISEASE; RIGHT MAXILLARY SINUSITIS
619		0619	A				X	A	NO	2-3	OA FOOT; HALLAX VULGUS
620		0620	G	X				YA	?M	4B	DENTAL DISEASE; SN; NSI BOTH FEMORAE AND TIBIAE; HEALED RICKETS
621		0621	G			X		YA	?F	4B	ENTHESOPATHY LEFT ULNA AND TIBIA; SACRALISATION COX1;HEALED RICKETS TIBIAE AND FIBULAE
622		0622	G				X	A	NO	2-3	ENTHESOPATHY CALCANEI
623		0623	A			X		PERI		2-3	
624		0624	G	X				C		2-3	BILATERAL CO
625		0625	P			X		A	NO	4B	ENTHESOPATHY RIGHT CALCANEUS
626		0626	G				X	MA	M	3A	
627		0627	G	X				OA	M	2-3	DENTAL DISEASE;SJD;DJD LEFT HIP; SCOLIOSIS; OA LEFT FOOT; ENTHESOPATHY BOTH FEMORAE AND RIGHT TIBIA AND BOTH CALCANEI

628		0628	P	X				MA	?M	3A	DENTAL DISEASE; SN; ENTHESOPATHY RIGHT ULNA, BOTH PATELLAE, CALCANEI, LEFT FEMUR AND LEFT TIBIA; POSSIBLE HEALED AND REMODELLED JUVENILE COLLES FRACTURE RIGHT SIDE; NSI LEFT TIBIA AND RIGHT FIBULA; DJD FOOT PHALANGES;
629		0629	A			X		YA	M	3A	L5 SPONDYLOLYSIS; LEFT OS ACROMIALE; SJD; SN; COMPRESSION FRACTURES T9 AND T11; ENTHESOPATHIES RIBS; POSSIBLE HEALED RICKETS
630		0630	A		X			A	?M	2-3	?HEALED FRACTURE LEFT CLAVICLE; ENTHESOPATHY RIGHT ULNA
631		0631	A	X				MA	M	2-3	MAXILLARY SINUSITIS; SN; SJD; ENTHESOPATHY LEFT PELVIS, BOTH TIBIAE, LEFT FIBULA, BOTH CALCANEI; HEALED RIGHT FIBULA FRACTURE; GOUT LEFT MT1 AND 2DRY OA
632		0632	G			X		MA	?F	2-3	SMITHS FRACTURE LEFT RADIUS; HEALED FRACTURE LEFT RIB; OP RIGHT MC 1; ?OPOR
633		0633	A		X			MA	F	2-3	SJD; ENTHESOPATHY LEFT RIB; METASTATIC CARCINOMA
634		0634	G			X		MA	M	2-3	DENTAL DISEASE, UNFUSED ACROMIUM; MAXILLARY SINUSITIS; DJD RIBS; DJD SHOULDERS; SJD
635		0635	A			X		A	?M	2-3	DENTAL DISEASE; OPOR;BILATERAL MAXILLARY SINUSITIS; FRACTURE AT MANUBRIUM HEALING, COMPRESSION FRACTURES AT T5-9 AND L3-4; 2NDRY KYPHOSIS; SJD; OA SHOULDER AND ELBOW
636		0636	G			X		A	NO	2-3	HEALED LEFT RIB FRACTURE; ENTHESOPATHIES BOTH CALCANEI; DJD RIGHT FOOT PHALANGE
637		0637	EQ					EQ	EQ	EQ	
638		0638	G			X		MA	?M	2-3	OA LEFT HAND; NSI BOTH TIBIAE AND FIBULAE; ENTHESOPATHIES BOTH CALCANEI
639		0639	A			X		AD	?F	2-3	

640		0640	G			X		YA	?M	2-3	DENTAL DISEASE; HEALED RICKETS LEFT ULNA AND RIGHT TIBIA; ENTHESOPATHY LEFT CLAVICLE AND HUMERUS; NSI RIGHT TIBIA; BENNETTS FRACTURE LEFT MC1
641		0641	A				X	A	?M	2-3	ENTHESOPATHY LEFT HUMERUS
642		0642	G	X				I		2-3A	RICKETS
643		0643	G		X			MA	M	3B	DENTAL DISEASE; LEFT MAXILLARY SINUSITIS; OA SHOULDERS, SPINE, RIGHT ELBOW; RIGHT WRIST; HANDS; HIPS; ENTHESOPATHY LEFT CLAVICLE, PELVISES AND RIGHT FEMUR; SN;T10-11 FUSED
644		0644	G	X				YA	M	2-3	DENTAL DISEASE; ASSYMMETRY 1ST RIBS; SN; ENTHESOPATHY LEFT PELVIS; DEPRESSIONS ON COSTAL FACETS OF T1
645		0645	A			X		I		2-3A	?SCURVY
646		0646	G		X			C		2-3	SCHEURMANNS DISEASE; SN
647		0647	G	X				C		2-3	DENTAL DISEASE; ABNORMAL POROSITY ON TEMPORAL WITH VASCULARITY; SCALLOPED LYTIC LESION RIGHT RIB END
648		0648	G			X		PERI		2-3	
649		0649	G		X			YA	M	2-3	SN; NSI ON BOTH FEMORAE AND RIGHT TIBIA; ENTHESOPATHY AT LEFT PATELLA AND BOTH CALCANEI
650		0650	G	X				I		2-3	
651		0651	G			X		C		2-3	
652		0652	G	X				MA	M	2-3	DENTAL DISEASE; LEFT MAXILLARY SINUSITIS; BILATERAL CO; SN; CONGENITAL S1 MALFORMATION; ENTHESOPATHY ON FIBULAE;FRONTAL SINUSITIS
653		0653	G			X		I		2-3	LEFT CO
654		0654	A	X				A	F	2-3	DENTAL DISEASE; BILATERAL CO; BILATERAL MAXILLARY SINUSITIS; DJD SHOULDERS, RIGHT FOOT; SJD; HEALED LEFT RIB FRACTURE; ENTHESOPATHY RIGHT HUMERUS, LEFT ULNA, RIGHT FEMUR, BOTH CALCANEI

655		0655	G		X			C		2-3	ABNORMAL POROSITY AND FLARING OF RIGHT RIB ENDS - NON SPECIFIC
656		0656	G	X				I		2-3	
657		0657	G				X	C		2-3	LEFT CO
658		0658	A				X	C		4B	
659		0659	A		X			I		2-3	
660		0660	G				X	YA	NO	4B	ENTHESOPATHY AT LEFT CLAVICLE
661		0661	G	X				F		2-3	
662		0662	G	X				I		2-3	
663		0663	G		X			YA	M	2-3	DENTAL DISEASE; SN; HERNIA T6 AD T11; DJD RIBS; ENTHESOPATHY RIGHT HUMERUS
664		0664	A				X	I		2-3	NO
665		0665	A				X	A	NO	4B	POSSIBLE RA; ENTHESOPATHIES TIBIA AND FIBULA; LYTIC LESIONS AND SUBLUXATIO ON BOTH FEET; OA RIGHT FOOT
666		0666	G			X		F		2-3	
667		0667	G				X	A	NO	2-3	
668		0668	G			X		MA	?F	2-3	DENTAL DISEASE; DJD SHOULDER AND HIP; SJD; 2DRY OA BOTH ELBOWS; HEALED LEFT RIB FRACTURES; NON UNION FRACTURES BOTH ULNAE; SN; OA ON NON UNITED FRAGMENTS OF LEFT ULNA
669		0669	G		X			C		2-3	
670		0670	G				X	A	NO	2-3	ENTHESOPATHIES RIGHT TIBIA AND LEFT CALCANEUS
671		0671	G	X				C		2-3	
672		0672	G		X			A	?M	2-3	LEFT CO; SJD; BLADDER STONES?; ENTHESOPATHIES BOTH CLAVICLES;DENTAL DISEASE
673		0673	G	X				C		2-3	SPINA BIFIDA ATLANTA; OSTEOCHONDROSIS DISSECANS LEFT HUMERUS; ENTHESOPATHIES BOTH CLAVICLES
674		0674	G		X			PERI		2-3	
675		0675	G	X				I		2-3	

676		0676	G				X	A	NO	2-3	FUSED INTERMEDIATE/DISTAL PHALANGE; DJD LEFT FOOT
677		0677	ND					ND	ND	ND	
678		0678	A	X				C		2-3	BILATERAL CO; MAXILLARY SINUSITIS
679		0679	ND					ND	ND	ND	
680		0680	A	X				YA	?M	2-3B	BILATERAL CO; DENTAL DISEASE; SJD; DJD KNEES, LEFT HAND; SN; ENTHESOPATHY LEFT PATELLA
681		0681	G	X				MA	F	2-3	OA SHOULDER; RIGHT KNEE; SJD; SN; DENTAL DISEASE
682		0682	G			X		C		2-3	
683		0683	P				X	AD		2-3	
684		0684	G			X		YA	M	2-3	SJD; SN
685		0685	G			X		I		2-3	
686		0686	G				X	I		2-3	
687		0687	G	X				I		2-3	
688		0688	G				X	AD		2-3	
689		0689	G	X				C		2-3	BILATERAL CO; DENTAL DISEASE; NSI LEFT FEMUR; ENTHESOPATHY LEFT HUMERUS
690		0690	G	X				C		2-3	
691		0691	A		X			MA	M	2-3	OA SPINE; ENTHESOPATHIES BOTH PATELLAE,TIBIAE,FIBULAE, PELVIS, FEMORAE AND CALCANEI, LEFT CLAVICLE, HUMERI, LEFT ULNA; DENTAL DISEASE; RIGHT MAXILLARY SINUSITIS; OA RIGHT SHOULDER, HAND AND BOTH KNEES; SJD;SN
692		0692	G		X			A	NO	2-3	OA RIGHT SHOULDER, HAND AND BOTH KNEES;SJD; ENTHESOPATHY RIGHT HUMERUS, ULNAE, FEMORAE; BONY BRIDGES T6-12
693		0693	ND					ND	ND	ND	
694		0694	G	X				I		2-3	?RICKETS
695		0695	G		X			A	M	2-3	DENTAL DISEASE;LEFT MAXILLARY SINUSITIS;SCLEROSING OSTEOMYELITIS OF GARRE ON LEFT HUMERUS; NSI LEFT RIBS; ENTHESOPATHY LEFT TIBIA

696		0696	P				X	A	NO	2-3	ENTHESOPATHY RIGHT PATELLA; NEW BONE ON RIGHT DISTAL FEMUR
697		0697	G	X				YA	M	2-3	DENTAL DISEASE;SACRALISATION L5; SPONDYLOLYSIS L4; DJD RIGHT ELBOW, SPINE, COSTOTRANSVERSE JOINT; MYOSITIS OSSIFICANS AT RIGHT PELVIS; NSI BOTH TIBIAE, LEFT FIBULA, RIGHT RADIUS; ENTHESOPATHY LEFT PATELLA
640		0698	G	X				MA	F	2-3	MYOSITIS OSSIFICANS TRAUMATICA LEFT FEMUR?; SPONDYLOLYSIS L5; FUSION OF UNIDENTIFIED 4TH OR 5TH FOOT PHALANGES
699		0699	G				X	F		2-3	
700		0700	G		X			I		2-3	
701	A	0701A	P		X			MA	M	2-3	SJD, SN
701	B	0701B	G	X				MA	M	2-3	DISH; DJD SHOULDER, LEFT FOOT, FEET; SJD; ENTHESOPATHY RIGHT ULNA, FEMUR, PELVIS, PATELLA, TIBIA, FIBULA; FUSION OF C2-3; GOUT BOTH MT1
702		0702	A			X		C		2-3	BILATERAL CO; DENTAL DISEASE
703		0703	G	X				I		2-3	SCURVY AND OR RICKETS
704		0704	G				X	I		2-3	
705		0705	A		X			I		2-3	?CIST IN OCCIPITAL
706	A	0706A	G				X	C		2-4	
706	B	0706B	G				X	A	NO	2-4	ENTHESOPATHY CALCANEI
707		0707	A				X	A	NO	2-3	
708		0708	A	X				C		2-3	DENTAL DISEASE; ENTHESOPATHIES BOTH HUMERII AND RIGHT TIBIA
709		0709	P			X		A	?M	2-3	OA COSTOVERTEBRAL; SJD; SN
710		0710	P				X	A	NO	4B	
711		0711	A				X	A	NO	2-3	DJD LEFT HAND
712		0712	A				X	A	NO	2-3	ENTHESOPATHY CALCANEUS; OSSICLE LEFT TALUS;
713		0713	G	X				C		2-3	DENTAL DISEASE; LEFT MAXILLARY SINUSITIS
714		0714	G				X	C		2-3	
715		0715	G			X		C		2-3	

716	A	0716A	A				X	A	M	2-3	
716	B	0716B	A	X				YA	M	2-3	RIGHT MAXILLARY SINUSITIS; DENTAL DISEASE; ADDITIONAL ARTICULAR SURFACE MT1
717		0717	P				X	N/O		4B	DENTAL DISEASE
718		0718	A	X				YA	F	2-3	SPINA BIFIDA ATLANTA; BILATERAL ENTHESOPATHIES FIBULAE;DENTAL DISEASE
719		0719	G		X			YA	F	2-3	DENTAL DISEASE
720		0720	P	X				A	F	1-3	DENTAL DISEASE; BILATERAL MAXILLARY SINUSITIS; SN
721		0721	A			X		OA	M	2-3	SJD;DJD
722		0722	G		X			MA	M	4B	SJD; SN; COMPRESSION FRACTURE L5; SACRALISATION COX1; ENTHESOPATHY LEFT PELVIS, BOTH CALCANEI
723		0723	G	X				C		2-3	RICKETS
724		0724	A		X			C		2-3	WOVEN BONE PLEURAL ASPECTS OF RIGHT RIBS - NSI
725		0725	G				X	PERI		2-3	
726		0726	G	X				I		2-3	
727		0727	G				X	I		2-3	
728		0728	G			X		C		2-3	
729		0729	G			X		C		2-3	
730		0730	A	X				I		2-3	
731		0731	A	X				I		2-3	SCURVY
732		0732	A	X				YA	?M	2-3	DENTAL DISEASE; SN; HEALED RICKETS; ENTHESOPATHY RIGHT HUMERUS AND ULNA
733		0733	G				X	A	NO	2-3	CONGENITAL FUSION OF RIGHT HAND BONES
734		0734	G	X				I		2-3	
735		0735	G				X	I		2-3	FLATTENING OF ANTERIOR PROXIMAL HUMERAL SHAFT
736		0736	G		X			YA	M	2-3	ENTHESOPATHIES BOTH CLAVICLES, SN; DJD LEFT RIB, DENTAL DISEASE
737		0737	G				X	A	NO	2-3	
738		0738	G				X	A	M	2-3	ENTHESOPATHY LEFT PATELLA, LEFT TIBIA
739	A	0739A	G				X	A	NO	2-3	

739	B	0739B	G	X				C		2-3	DENTAL DISEASE
740		0740	G			X		A	?M	2-3	SJD; ENTHESOPATHY RIGHT CLAVICLE, HUMERUS
741		0741	A				X	C		2-3	
742		0742	A				X	A	NO	1-3	DJD ON BOTH ANKLES AND RIGHT FOOT; ENTHESOPATHY ON BOTH CALCANEI
743		0743	A		X			MA	M	2-3	ENTHESOPATHY LEFT SCAPULA, LEFT PELVIS; SN; SJD; KYPHOSIS;SACRALISATION OF COX1
744		0744	A				X	I		2-3	
745		0745	A				X	I		2-3	
746		0746	G			X		YA	F	2-3	EITHER SEVERE ENTHESOPATHY OR MYOSSITIS OSSIFICANS AT BOTH PELVISES
747		0747	A				X	A	NO	2-3	
748		0748	G	X				MA	M	4B	DENTAL DISEASE; NSI LEFT RIBS, RIGHT MT2; ENDOCRANIAL LESIONS (SES); ENTHESOPATHY RIGHT PATELLA AND BOTH CALCANEI;BILATERAL MAXILLARY SINUSITIS;
749		0749	A				X	A	NO	2-3	
750		0750	A	X				C		2-3	DENTAL DISEASE
751		0751	A	X				C		2-3	DENTAL DISEASE; BILATERAL CO; POROTIC HYPEROSTOSIS; ENTHESOPATHY AT RIGHT CLAVICLE
752		0752	A		X			C		2-3	DENTAL DISEASE;BILATERAL CO; BILATERAL MAXILLARY SINUSITIS;
753		0753	P				X	C		2-3	
754		0754	A			X		MA	M	2-3	DJD SPINE COSTOTRANSVERSE JOINTS; MALALIGNED HEALED FRACTURE RIGHT FEMUR
755		0755	A	X				MA	F	2-3	DENTAL DISEASE; NSI BOTH TIBIAE, RIGHT FIBULA; ENTHESOPATHY CALCANEI; LEFT MAXILLARY SINUSITIS; OA RIBS; SN
756		0756	A	X				YA	F	2-3	LUMBARISATION; RIGHT CERVICAL RIB; RIB THICKENING; CORTICAL DEFECT RIGHT DISTAL HUMERUS
757		0757	G		X			MA	F	2-3	SJD; DJD HAND; HEALED LEFT RIB FRACTURE; ENTHESOPATHY RIGHT TIBIA

758		0758	G		X			OA	F	2-3	OA RIGHT SHOULDER, ELBOW, WRIST, HAND, KNEE AND BOTH FEET; ENTHESOPATHY RIGHT HUMERUS, ULNA, FEMUR, PELVIS, PATELLA AND BOTH CALCANEI; COLLES HEALED FRACTURE AT RIGHT RADIUS; HEALED RIGHT FOOT FRACTURE (3 PROX PHALANGE);SJD;OPOR;SN;SACRALISATION COX1;COMPRESSIO FRACTURE T9-12
759		0759	G		X			C		2-3	LEFT CO; BILATERAL MAXILLARY SINUSITIS; ABNORMAL POROSITY ON MAXILLARY ANTERIOR SURFACES; ENTHESOPATHY RIGHT CLAVICLE
760		0760	A	X				YA	F	2-3	DENTAL DISEASE;BILATERAL MAXILLARY SINUSITIS; SJD; SN;ENTHESOPATHY LEFT FEMUR
761		0761	G	X				PERI		2-3	
762		0762	G	X				I		2-3	LEFT CO; BILATERAL MAXILLARY SINUSITIS
763		0763	G	X				PERI		2-3	
764		0764	G			X		PERI		2-3	
765		0765	G	X				C		2-3	BILATERAL CO; ABNORMAL POROSITY ON BOTH SPHENOID;SCURVY?
766		0766	A	X				MA	F	2-3	OPOR; DISLOCATED RIGHT MANDIBLE; OA LEFT SHOULDER, HANDS, WRISTS, KNEES, FIBULAE; SJD; ENTHESOPATHIES PATELLAE, RIGHT TIBIA, HUMERI; HEALED OSTEOCHONDROSIS DISSECANS LEFT HUMERUS;TB SPINE
767		0767	A				X	C		2-3	
768		0768	A	X				YA	M	2-3	DENTAL DISEASE; FRONTAL CYST; SN; ENTHESOPATHY LEFT HUMERUS, LEFT TIBIA; HEALED FRACTURE LEFT HAND PHALANGES
769		0769	P				X	A	NO	2-3	DJD KNEES
770		0770	A	X				A	?F	1-2	DENTAL DISEASE; CO; SN
771		0771	A			X		C		2-3	OSTEOMYELITIS LEFT TIBIA; 2DRY PERIOSTITS LEFT FIB
772		0772	A	X				C		1-2	
773		0773	G	X				YA	?F	2-3	DENTAL DISEASE; BILATERAL MAXILLARY SINUSITIS; RIGHT FRONTAL SINUSITIS

774		0774	G	X				YA	M	2-3	DENTAL DISEASE; BILATERAL MAXILLARY SINUSITIS; SJD; HEALED FRACTURE LEFT HAND PHALANGE; SLIGHT BOWING RIGHT TIBIA AND RIGHT FIBULA; ENTHESOPATHY BOTH CALCANEI; MACROPOROSITY LEFT NAVICULAR; UNHEALED FRACTURE RIGHT INTERMEDIATE AND DISTAL FOOT PHALANGE
775		0775	A				X	I		2-4	
776		0776	G	X				YA	M	2-3	SJD; CO
777		0777	G		X			A	?M	2-3	DENTAL DISEASE; CO; ENTHESOPATHY BOTH CLAVICLES; OA RIGHT ACROMIOCLAVICULAR, SHOULDERS, COSTOVERTEBRAL JOINTS;SJD; RIGHT MAXILLARY SINUSITIS; SN
778	A	0778A	A				X	I		2-3	
778	B	0778B	A				X	I		2-3	
779		0779	G	X				C		2-4	DENTAL DISEASE;RICKETS;NON UNION PARS LATERALIS AND SQUAMA
780		0780	G				X	A	NO	2-3	DJD ON STERNUM
781		0781	P				X	A	?F	1	RIGHT MAXILLARY SINUSITIS;DENTAL DISEASE
782		0782	G	X				MA	F	2-3	LEFT MAXILLARY SINUSITIS; SJD; SN; NSI RIGHT FIBULA;DENTAL DISEASE
783		0783	A	X				PERI		2-3	
784		0784	A				X	C		2-4	
785		0785	G	X				YA	F	2-3	DENTAL DISEASE; SN; ENTHESOPATHY RIGHT CALCANEUS; BILATERAL MAXILLARY SINUSITIS
786		0786	NS					NS	NS	NS	
787		0787	A			X		MA	?F	2-3	DJD BOTH SHOULDERS; SJD; SN; ENTHESOPATHY LEFT FEMUR; PERIOSTITIS 2 RIB PLEURAL ASPECT
788		0788	G				X	A	NO	1?	ENTHESOPATHY RIGHT PATELLA AND BOTH CALCANEI; DJD RIGHT KNEE, RIGHT MT 1
789		0789	G	X				MA	M	2-3	DJD RIGHT SHOULDER AND COSTOVERTEBRAL JOINTS; ENTHESOPATHY RIGHT ULNA AND RADIUS; SN; NSI RIB ENDS; SACRALISATION L5;DENTAL DISEASE

790		0790	P		X			A	?M	2-3	DENTAL DISEASE; DJD BOTH KNEES; ENTHESOPATHY AT CALCANEI
791		0791	G		X			AD	?M	2-3	DENTAL DISEASE; SPINA BIFIDA; RIGHT MAXILLARY SINUSITIS; HEALED CO; ENDOCRANIAL LESIONS AT FRONTAL
792		0792	G		X			A	F	2-3	ENTHESOPATHY BOTH HUMERI; TB; SJD; 2DARY KYPHOSIS T7-10
793		0793	A				X	A	?M	2-3	DENTAL DISEASE
794		0794	G		X			MA	M	2-3	DENTAL DISEASE; SJD; HEALING FRACTURE LEFT RIB;ENTHESOPATHY RIGHT ULNA; SN; COMPRESSION FRACTURES L1-3
795		0795	G	X				C		2-3	SPINA BIFIDA C2; HEALED RICKETS
796		0796	A		X			OA	M	2-3	
797		0797	ND					ND	ND	ND	
798		0798	G				X	C		2-3	DENTAL DISEASE; BILATERAL MAXILLARY SINUSITIS
799		0799	A	X				MA	?M	2-3	DENTAL DISEASE, OSTEOID OSTEOMA ON FRONTAL; BILATERAL MAXILLARY SINUSITIS; LEFT AUDITORY OTITIS; DJD RIGHT SHOULDER; SN
800		0800	G				X	A	M	2-3	REMODELLED STRIATED BONE LEFT FEMUR
801		0801	G	X				C		2-3	BILATERAL CO; POROTIC HYPEROSTOSIS BOTH PARIETALS; ENTHESOPATHY LEFT CLAVICLE
802		0802	G	X				I		2-3	
803		0803	A		X			I		2-3	DIMPELING OF ENDOCRANIAL SURFACE OF SKULL-SES
804		0804	G			X		A	?M	2-3	DJD RIGHT SHOULDER; SJD; COSTOVERTEBRAL JOINTS; LEFT WRIST; LEFT HAND; OSTEOPHYTOSIS T5-11(EARLY DISH?)
805		0805	G	X				AD	F	2-3	DENTAL DISEASE; MAXILLARY SINUSITIS; SN; RIGHT CALCANEUS NOTCH; FUSION MT5 PHALAGES
806		0806	ND					ND	ND	ND	C
807		0807	G			X		MA	M	1-2	SPINA BIFIDA S1; ENTHESOPATHY BOTH PATELLAE AND CALCANEI; HEALED FRACTURE RIGHT FIBULA; PERIOSTITIS RIGHT TIBIA; DJD

											FOOT PHALANGES
808		0808	G			X		MA	F	1-2	DJD L4; NSI BOTH TIBIAE, LEFT FIBULA AND LEFT MT1; POROSITY 1ST INTERMEDIATE FOOT PHALANGES; PA; OPOR
809		0809	G	X				MA	M	1-2	RIGHT MAXILLARY SINUSITIS; OA SHOULDER. ELBOWS, HIPS, HANDS, KNEES, TIBIOFIBULAR JOINT; SJD; ENTHESOPATHY HUMERUS, RIGHT ULNA, PELVIS, FEMUR, PATELLA, TIBIA, CALCANEUS; SACRALISATION L5; MYOSITIS OSSIFICANS TRAUMATICA RIGHT TIBIA AND FIBULA DISTAL; POSSIBLE GOUT
810		0810	A				X	A	NO	1-3A	
811		0811	G				X	A	NO	1-2	FUSION INTERMEDIATE AND DISTAL 5TH LEFT MT
812		0812	G	X				C		2-3	BILATERAL CO
813		0813	G				X	C		2-3	
814		0814	G				X	C		2-3	
815		0815	G	X				YA	M	2-3	DENTAL DISEAE; EROSIVE ENTHESOPATHY RIGHT CLAVICLE; OA BOTH CLAVICLES; COMPRESSION FRACTURE L5
816		0816	G				X	A	NO	2-3	
817		0817	A			X		A	M	2-3	DENTAL DISEASE; SJD
818	A	0818A	G				X	C		2-3	
818	B	0818B	G		X			C		2-3	
819	A	0819A	G				X	C		2-3	
819	B	0819B	G				X	I		2-3	
820		0820	G	X				YA	M	2-3	SN; PERIOSTITIS BOTH TIBIAE AND FIBULAE;DENTAL DISEASE
821		0821	A				X	A	NO	1-2	ENTHESOPATHIES BOTH CALCANEI; DJD LEFT PROXIMAL PHALANGE
822		0822	G				X	A	NO	1-2	ANKYLOSIS OF INTERMEDIATE AND DISTAL HAND PHALANGE 2 OR 4; PA OR RA?
823		0823	G			X		C		1-2	

824		0824	G	X				MA	M	2-3	SJD; OA BOTH ELBOWS, WRISTS; SN
825		0825	P			X		A	?M	2	MAXILLARY SINUSITIS; OMAL; NSI PLEURAL RIBS; SN
826		0826	A	X				A	F	1-2	DENTAL DISEASE; DJD TEMPOROMADIBULAR JOINTS;SJD; BILATERAL MAXILLARY SINUSITIS
827		0827	G				X	C		2-3	
828		0828	G			X		A	F	2-3	DENTAL DISEASE; DJD COSTOVERTEBRAL JOINTS
829		0829	G				X	PERI		2-3	
830		0830	G				X	C		2-3	
831		0831	G			X		C		2-3	T5-6 FUSION OF SPINOUS PROCESSES
832		0832	G			X		C		2-3	ENTHESOPATHIES BOTH TIBIAE
833	A	0833A	G		X			YA	F	1-2	DENTAL DISEASE; SJD; OA KNEES; ENTHESOPATHIES BOTH PELVIS
833	B	0833B	G				X	A	NO	1-2	
834		0834	NS					NS	NS	NS	
835		0835	P		X			A	NO	1	SN
836		0836	A				X	N/O		1	
837		0837	A	X				MA	F	1	MALFORMATION OF RIGHT NAVICULAR AND CUBOID; DENTAL DISEASE
838		0838	P				X	I		1	
839		0839	P		X			OA	M	1-3A	DENTAL DISEASE; SJD; FUSED SACROILIAC JOINT
840		0840	P	X				C		1	BILATERAL CO; DENTAL DISEASE
841		0841	A				X	C		1	
842		0842	G	X				I		2-3	CONGENITAL ABSENCE OF LOWER THORACIC VERTEBRA
843		0843	A				X	A	NO	2-3	
844		0844	G				X	PERI		2-3	
845		0845	G			X		A	?F	2-3	ENTHESOPATHY LEFT TIBIA; FUSION INTERMEDIATE AND DISTAL RIGHT 5MT
846		0846	EQ					EQ	EQ	EQ	
847		0847	P	X				AD	?M	1	BILATERAL CO; NSI RIGHT TIBIA
848		0848	A				X	I		1-3	
849		0849	A			X		C		2-3	
850		0850	A				X	A	NO	2-3	

851		0851	G	X				C		2-3	DENTAL DISEASE; BILATERAL CO
852		0852	G				X	A	NO	2-3	
853		0853	G			X		C		2-3	BILATERAL CO;DENTAL DISEASE
854		0854	G				X	A	NO		HEALED FRACTURE LEFT FIBULA; PERIOSTITIS LEFT FIBULA AND TIBIA; ENTHESOPATHY ON CALCANEI; DJD MT PHALANGE
855		0855	G				X	C		2-3	NSI RIGHT TIBIA, FIBULA AND CALCANEUS
856		0856	P		X			YA	M	1-2	DENTAL DISEASE
857		0857	NS					NS	NS	NS	
858		0858	A	X				I		2-3	
859		0859	A				X	A	?M	2-3	DJD LEFT SHOULDER
860		0860	G	X				PERI		2-3	
861		0861	G	X				OA	M	2-3	OPOR; BILATERAL MAXILLARY SINUSITIS; HEALED FRACTURE CLAVICLE AND HUMERUS; COMPRESSION FRACTURE; KYPHOSIS AND SCOLIOSIS; DJD SHOULDERS; UNHEALED RIB FRACTURE; NECROSIS OF GREATER TROCHANTED; NSI TIBIA; POROSITY LEFT FEMUR AND TIBIA; ENTHESOPATHIES BOTH ULNAE, CALCANEI, LEFT PATELLA; FUSION OF BOTH INTERMEDIATE AND DISTAL FOOT PHALANGES (4-5)
862		0862	A			X		I		2-3	SCURVY
863		0863	G		X			I		2-3	SCURVY; ABNORMAL POROSITY AT LEFT MAXILLA; WIDENING OF METAPHYSIS OF LEFT HUMERUS, BOTH RADII, RIGHT ULNA, BILATERAL RIB ENDS
864		0864	G			X		MA	F	2-3	SN; ENTHESOPATHY LEFT ULNA; ACCESSORY ARTICULAR SURFACE ON ILIUMS
865		0865	G	X				YA	F	2-3	DENTAL DISEASE; BILATERAL CO; BILATERAL MAXILLARY SINUSITIS; SN
866		0866	A		X			PERI		2-3	
867		0867	G			X		A	M	2-3	ENTHESOPATHY LEFT FEMUR, RIGHT PATELLA, BOTH FIBULAE; ADDITIONAL ARTICULAR SURFACE MT1

868		0868	A		X			I		2-3	
869		0869	A		X			I		2-3	RIGHT CO; BILATERAL MAXILLARY SINUSITIS
870		0870	A			X		I		2-3	
871		0871	G				X	A	NO	2-3	DJD RIGHT 1MT; RESORPTION OF 4TH PROXIMAL FOOT PHALANGE
872		0872	G	X				YA	F	2-3	DENTAL DISEASE; LEFT MAXILLARY SINUSITIS; OPOR AND SECONDARY KYPHOSIS; ENTHESOPATHY LEFT CLAVICLE AND RIGHT CALCANEUS;RIB HEAD DEFORMITY
873		0873	G				X	A	NO	2-3	NSI BOTH TIBIAE; ADDITIONAL ARTICULAR SURFACE BOTH MT1; FUSION OF INTERMEDIATE AND DISTAL LEFT MT5 PHALANGES
874		0874	A	X				YA	F	2-4	BILATERAL MAXILLARY SINUSITIS; DENTAL DISEASE; SPONDYLOLYSIS L5
875		0875	G		X			YA	F	2-3	DENTAL DISEASE; SN
876		0876	P				X	MA	F	2-3	SJD
877		0877	A	X				I		2-3	
878		0878	G				X	A	NO	2-3	
879		0879	G	X				YA	M	2-3	BILATERAL MAXILLARY SINUSITIS
880		0880	A			X		MA	M	2-3	SJD; ?HEALED RICKETS;DENTAL DISEASE
881		0881	A	X				OA	F	2-3	SN; DISC HERNIATION T5-6; SFT OR AMPUTATION RIGHT 3RD PHALANGE HAND;DJD BOTH RIBS; BILATERAL MAXILLARY SINUSITIS; FUSION OF LEFT SACROILIAC JOINT
882	A	0882A	A				X	A	NO	2-4	ADDITIONAL ARTICULAR SURFACE ON BOTH MT1, DOUBLE FACET ON BOTH CUNEIFORM AND MT1
882	B	0882B	G				X	A	NO	2-4	
883		0883	G				X	A	NO	2-4	ENTHESOPATHIES RIGHT TIBIA, CLAVICLE; OSTEOMA RIGHT TIBIA; HALLAX VULGUS; DJD 5TH MT PHALANGE
884		0884	P				X	I		4B	

885		0885	G		X			MA	M	2-3	SPINA BIFIDA OCCULTA; MYOSITIS OSSIFICANS RIGHT HUMERUS AND TIBIA; HEALED FRACTURE LEFT RIBS; DJD SHOULDER; SN; ENTHESOPATHY LEFT FEMUR, RIGHT CLAVICLE AND BOTH HUMERI;NSI ON RIGHT FIBULA;OSSICLE ON RIGHT CALCANEUS
886		0886	A		X			I		2-3	
887		0887	A	X				C		2-3	RICKETS
888		0888	A				X	C		2-3	
889		0889	NS					NS	NS	NS	
890		0890	G			X		C		2-3	DENTAL DISEASE;ENTHESOPATHY RIGHT CLAVICLE AND BOTH HUMERI
891		0891	A				X	I		2-3	NO
892		0892	A	X				MA	F	2-3	DENTAL DISEASE; OA SPINE; COMPRESSION FRACTURE L5; DJD RIGHT FOOT
893		0893	G		X			YA	F	2-3	DENTAL DISEASE; SN; ENTHESOPATHIES BOTH HUMERI
894		0894	A		X			YA	M	2-3	HEALED RIB FRACTURE; MAXILLARY SINUSITIS; SN AND DISC HERNIATION; ENTHESOPATHY LEFT PELVIS
895		0895	A		X			I		1	
896		0896	A				X	C		2-3	
897		0897	A			X		C		2-3	BILATERAL CO
898		0898	G				X	A	NO		
899		0899	A			X		C		2-3	
900		0900	NS					NS	NS	NS	
901		0901	G				X	A	?F	2-3	DENTAL DISEASE; OP LEFT OCCIPITAL CONDYLE
902		0902	G	X				I		1	
903		0903	G	X				F		2-3	
904		0904	G	X				F		2-3	

905		0905	G			X		YA	M	2-3A	HEMISPONDYLOSIS L4; SACRALISATION L5; SN; DJD BOTH KNEES; ENTHESOPATHIES BOTH FEMORAE, RIGTH TIBIA, RIGHT CALCANEUS; HEALED RICKETS; DJD HANDS, HIPS; BONE LOSS ILIUMS; ADDITIONAL ARTICULAR FACET LEFT FIBULA
906		0906	A		X			C		2-3A	BILATERAL ENTHESOPATHY BOTH CLAVICLES AND RIGHT TIBIA; COMPRESSION FRACTURE L2-L5; HEALED RICKETS
907		0907	G	X				I		1	SCURVY
908		0908	G			X		A	M	1	SN; NSI FEMORAE, TIBIAE AND RIGHT FIBULA
909		0909	P	X				C		1	
910		0910	P	X				AD		1	BILATERAL MAXILLARY SINUSITIS
911		0911	G	X				I		1	OCCIPITAL BUN
912		0912	G	X				I		1	ZYGOMATIC/TEMPORAL?ABNORMAL POROSITY
913		0913	P			X		MA	?M	1	SJD
914		0914	A	X				MA	M	1	DENTAL DISEASE; BILATERAL CO; ENTHESOPATHY RIGHT HUMERUS, LEFT CLAVICLE
915	A	0915A	G		X			PERI		1	SCURVY?
915	B	0915B	G			X		C		1	BILATERAL CO
916		0916	P				X	I		1	
917		0917	P				X	A	NO	1-3A	
918		0918	G		X			YA	?M	2-4	HEALED FRACTURE LEFT RADIUS;OA LEFT ELBOW, RIGHT HAND, KNEES; SJD; ENTHESOPATHY BOTH PELVIS, LEFT FEMUR, BOTH PATELLAE
919		0919	A			X		A	?M	2-3	SN
920		0920	A	X				C		2-3	BILATERAL CO; ABNORMAL POROSITY SPHENOID AND PALETINE PROCESS;SCURVY
921		0921	P				X	MA	M	1-3A	SJD; SPONDYLOLYSIS L4; OA HAND
922		0922	A			X		I		1	
923		0923	A				X	A	NO	2-3	
924		0924	A				X	C		2-3	
925		0925	G				X	A	NO		ANKYLOSIS C2 AND 3; POSSIBLE SJD

926		0926	A			X		A	?M		ENTHESOPATHY RIGHT CLAVICLE, RIGHT TIBIA, LEFT CALCANEUS
927		0927	G				X	A	M		DENTAL DISEASE; NSI RIGHT ORBIT
1000		1000	G			X		PERI			
1001		1001	G			X		F			
1002		1002	G			X		F			
1003		1003	G			X		F			
1004		1004	G			X		F			
18		0018	NS					NS	NS	NS	

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