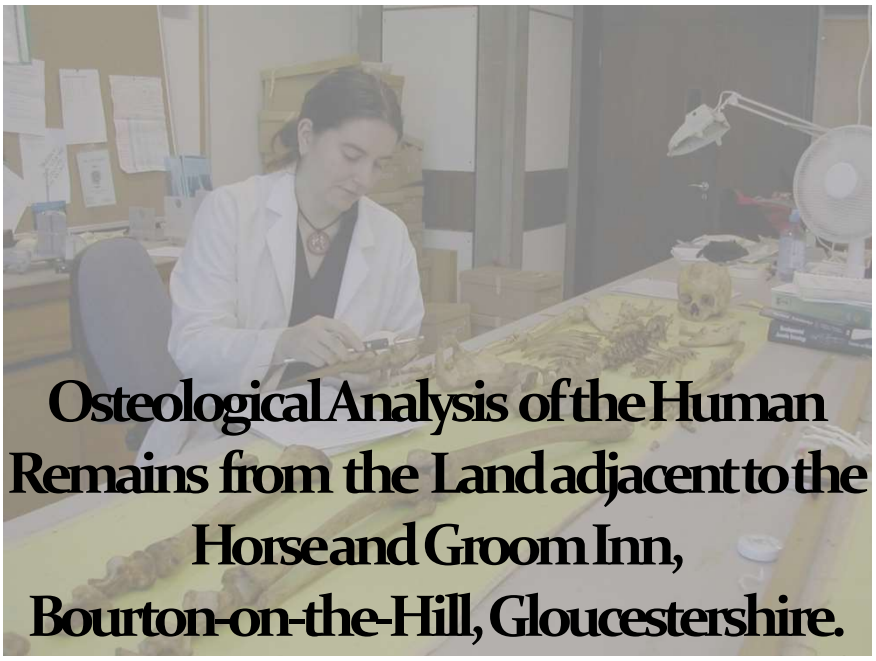

Osteological Analysis of the Human Remains from the Land adjacent to the Horse and Groom Inn, Bourton-on-the-Hill, Gloucestershire.

A Report for L-P Archaeology and Urban Archaeology

April 2014, updated March 2016

Project OA1044

1. Introduction

The aim of this report is to present the data obtained from the osteological analysis of human skeletal remains recovered during an excavation at the site of the Horse and Groom Inn, Bourton-on the-Hill, Gloucestershire (NGR: SPR 1731 3258, site code HGI 11). The excavation was carried out by L-P Archaeology (See Harwood (2011) for details of the evaluation).

During the course of the archaeological investigations, five deposits were excavated containing human skeletal remains. The first was a sub-circular burial pit [652], containing the remains of one inhumated adult individual, SK(649) (See Plate 1). This skeleton was in a crouched position, lying on its left hand side, aligned on an approximately N-S axis. Animal bones, likely to represent a joint of meat, were found in the area of the right shoulder. In addition, the remains of a sub-adult, SK(627), were recovered from the backfill of the pit; these remains were not associated with a separately cut pit or grave. The backfill was noted to comprise of 'occupational' debris material rather than a natural matrix and also contained large fragments of a broken vessel dating to the middle Iron Age.

Three further deposits contained sub-adult skeletal remains that consisted of disarticulated, though in some cases apparently associated, elements. Context SK(473) was also discovered in the quarry pit (475) within lenses of occupation material contained in its backfill. The quarry pit is thought to date to the medieval period and broadly contemporary with context SK(739), contained in the backfill of a pit that had been disturbed by badger burrowing. The final deposit containing context SK(490) consisted of a disturbed deposit associated with a medieval metalled yard surface in the vicinity of a late Iron Age/early Roman backfilled ditch. The disturbance and backfilling of the features containing the disarticulated sub-adult remains suggest the possibility of these elements having been re-deposited.

Osteoarchaeological analysis was undertaken to assess the condition and completeness of the human skeletal remains recovered from the re-excavated graves as well as to determine the age, sex and stature of the individuals present. Any non-metric traits, skeletal and dental pathologies were also recorded. An overview of the overall findings for the group is presented here in addition to a summary catalogue of the human remains per context. Due to the small sample size and preservation of some of the skeletal remains, prevalence rates of pathologies within the group were not calculated; any skeletal or dental pathologies are recorded according to individual.

Additionally, stable isotope analysis was undertaken on a tooth enamel sample and bone sample for the purposes of assessing the geographical origins of this individual as well as diet. AMS dating was also undertaken to confirm the absolute date of the skeletal remains.

Plate 1: *Burial Pit [652], containing SK(649) (illustrated) and SK(627).*

2. Methods and Process

The skeletal material was analysed according to the standards laid out in the guidelines recommended by the British Association of Biological Anthropologists and Osteologists in conjunction with the IFA (Guidelines to the Standards for Recording Human Remains, Brickley and McKinley (eds) 2004) as well as by English Heritage (Human Bones from Archaeological Sites: Guidelines for producing assessment documents and analytical reports, Centre for Archaeology Guidelines, 2002).

Recording of the material was carried out using the recognised descriptions contained in Standards for Data Collection from Human Skeletal Remains by Buikstra and Ubelaker (1994). Full recording forms are supplied separately to be archived with any other archaeological

recording forms. All skeletal data has been recorded using an MS-Access database(s) which can be found on the CD-Rom provided.

The material was analysed macroscopically and where necessary with the aid of a magnifying glass for identification purposes. Where relevant, digital photographs have been used for illustration and a full digital image archive of all pathologies and any other features of interest has been provided on the CD-Rom enclosed with this report.

The material was analysed without prior knowledge of associated artefacts so that the assessment remained as objective as possible.

Comparison of the results was made with published osteological data from contemporary skeletal populations.

2.1 Reasons for the Analysis

Osteological analysis was carried out to ascertain:

- Inventory of the skeletal material
- Condition of bone present
- Completeness of the skeleton
- Age Assessment
- Sex Determination
- Non-metric Traits
- Stature and Morphometric Data
- Skeletal Pathology

- Dental Pathology

2.2 Skeletal Inventory

An inventory of the skeletal elements present is undertaken to assess the completeness of the skeletal remains and identify the number of individuals present. An inventory also provides information on the specific elements within the skeleton that are present and can be assessed for pathological changes. Each element is recorded as present or absent. The long bones are recorded according to the presence or absence of the proximal (upper), middle and distal (lower) sections as well as the proximal and distal joint surfaces. The completeness of the bones of the axial skeleton (with the exception of the spine) is recorded according to the categories of <25%, 25-50%, 50-75% and 75%>.

A summary inventory of the skeletal elements present for each individual is provided in the skeletal catalogue below (see Section 3). A full inventory can be found on the enclosed CD-Rom.

No duplication of elements was observed within any one context and the inventory taken confirmed that each context contained the remains of a single individual. The repetition of elements suggested that the minimum number of individuals present was four, consisting of one adult and three sub-adults.

2.3 Condition of the Bone Present

The condition of the bone was assessed macroscopically according to the categories and descriptions provided by the Guidelines to the Standards for Recording Human Remains (Brickley and McKinley, eds, 2004). Since most skeletons exhibit more than one grade of state of preservation, these categories are simplified into 4 main groups of preservation: Good (grades 0-2), Fair (grades 2-4), Poor (grades 4-5+) and Varied (more than 4 grades of condition). The condition of human bone can be influenced by both extrinsic (i.e. taphonomic conditions) and intrinsic (i.e. robustness) factors (Henderson 1987).

The skeletal remains SK(649), SK(627), SK(473), SK(490) and SK(739) were all recorded as being in 'good' condition, being scored as grades 0 and 1. Little surface erosion was noted in either skeletons and the epiphyses of skeleton (649) were generally intact.

2.4 Completeness of Skeletons

This is a guide to the overall completeness of the individual's skeletal remains and is calculated according to the percentage of the bones present in relation the total number of bones in a complete human skeleton. Completeness of remains is gauged through an assessment of the amount of material representing different areas of the body. A complete skeleton comprises of:

Skull = 20%

Torso = 40%

Arms = 20%

Legs = 20%

Each area of the skeleton was assessed and then placed into the following four categories of completeness: <25%, 25-50%, 50-75% and 75%> (Buikstra and Ubelaker 1994).

Recording the completeness of the individual can allow an insight to be gained into how much post-depositional activity has occurred as well as to assess how much information can potentially be gained from the remains.

SK (649) was over 75% complete, with only a small number of the carpal and finger bones absent as well as the coccyx and the left pubic bone. Some areas of the skeleton were fragmentary due to the shallow nature of the burial pit in was lying in exposing the elements to compression from post-deposition site activity. Nonetheless, the vast majority of the skeletal elements were present.

SK(627) was less than 25% complete, however, and was represented mainly by the right hand side of the cranium and mandible along with three ribs and one thoracic vertebral arch. It is likely that the remains were deposited in an articulated but that given their location at the surface of the burial pit, they were truncated by post-deposition activity.

SK(473) was less than 25% complete and only three partially complete long bones were present, consisting of the distal half of a left femur, distal half of a left radius and the distal half of a right

humerus. The breaks present in all the elements appeared to be old and likely resulted from post-deposition activity.

SK(490) was also less than 25% complete and consisted only of one complete right humerus and a few cranial bones. Given the nature of the deposit, it is unclear if these elements were associated and belong to the same individual.

SK(739) consists of only a single right incomplete right humerus exhibiting an old break. The element was discovered in a disturbed context and is disarticulated.

2.5 Age Assessment

Establishing the age and sex of individuals from an archaeological assemblage not only provides an insight into the demographic profile of the population but can also be used to inform us of patterns in pathological distributions in a skeletal assemblage.

The age of sub-adults is assessed using both dental development (Smith 1991) and eruption (Ubelaker 1989) as well as long bone lengths (Schaefer *et al*. 2009) and epiphyseal fusion (Scheuer & Black 2004). These methods can usually provide a reasonably accurate age estimation due to a relatively narrow range of variation in normal sub-adult development. Thus, sub-adults can be placed into the following age categories: Foetal (<36 weeks), Neonate (0-1 month), Young Infant (1-6 months), Older Infant (6-12 months), Child (1-5 years), Juvenile (6-12 years) and Adolescent (13-17 years).

Assessment of adult age at death, unfortunately, results in much less specific age estimates due to a much greater individual variation in the features exhibited by the examined elements at particular ages (Cox 2000). Age estimation of adults was assessed from analysis of the auricular surface (Lovejoy et al 1985) and the pubic symphysis (Brookes and Suchey, 1990). Each of these methods examines the deterioration of these surfaces and categorises them accordingly. This deterioration is due in part to due to the health status of the individual but can also be influenced by life-style and so the variation produced by these factors results in much wider age categories: Very Young Adult (18-24), Young Adult (25-34), Middle Adult (35-49) and Old Adult (50+) (Buikstra and Ubelaker, 1984). Grading of dental attrition was also used as a

supplementary age assessment technique using the Miles method (1963) where dentition sets were complete enough to allow fair observation.

SK(649) was an adult individual, estimated to have been aged between 25 and 40 years at death based on observations of the pubic symphysis and auricular surface. Dental attrition suggested a slightly younger age of 20-30. All observable epiphyses, including the medical clavicle, were fused, suggesting age of over 25 years. Overall, this individual was classified as a young-middle adult.

SK(627) was a sub-adult individual and based upon dental development, was aged at a maximum range of between 0-1.5 months at death. The average age at death was 1.2 – 1.4 months. Metric assessment of the maxilla suggested an age at death of approximately 40 weeks i.e. full term neonate but this age estimate is based upon modern population data that and no comparative data from archaeological sub-adult samples are available. Unfortunately, no long bones were present in this individual so no further metric analysis could be undertaken to estimate age. Overall, SK(627) was classified as an infant.

SK(473) was a sub-adult only represented by three partially complete long bone elements and age estimation was limited to inferences drawn from the width of the distal humerus and femur. This metric analysis suggested that this individual was 40 weeks i.e. full term neonate or over. In the absence of any further data, SK(473) has been classified here as a neonate but there is no definitive evidence that these remains were not also those of a young infant.

SK(490) was a sub-adult consisting of only a few elements. However, this included a complete right humerus. The metric analysis of this element indicated that the individual was 40 weeks, i.e. full term neonate, at death. This individual was therefore classified as a neonate.

SK(739) consisted of a single incomplete right humerus and no metric analysis could be undertaken to assess the age at death. It was clear, however, that overall that the element was from either a neonate or young infant.

2.6 Sex Determination

Sex is assessed using the criteria laid out by Buikstra and Ubelaker (1984) in the analysis of morphological features of the skull and pelvis. In addition, metric data is also used where possible, taking measurements of sexually dimorphic elements such as the femoral and humeral head (Bass 1995). Categories ascribed to individuals on the basis of this data were 'Male', Possible Male', 'Indeterminate', 'Possible Female', 'Female' and 'Unobservable'. Sex may be ascribed on the basis of metrics alone where no sexually dimorphic traits are observable. Where sex was not observable be either metric or morphological observations, it was recorded as 'Unobservable'. No sexing of sub-adult material is attempted due to the lack of reliable criteria available.

Based upon both morphological and metric assessment, SK(649) was classified as a male. The vast majority of observable sexually dimorphic features of both the pelvis and skull were male, with only the left mastoid recorded as 'indeterminate'. Similarly, the metric analysis of the femoral head and the humeral head indicated male sex, though measurement of the circumference of the nutrient foramen of the right tibia was 'indeterminate'.

No sex assessment was undertaken for SK(627), SK(473), SK(490) or SK(739) due to the remains being those of neonates or infants. There are currently no means for assessing the sex of sub-adult individuals.

2.7 Non-Metric Traits

Non-metric traits are morphological features that occur both in bone and dentition. These features have no specific functional purpose and occur in some individuals and not in others. The origins of non-metric traits have now been shown to be highly complex, each having its own aetiology and each being influenced to differing extents by genetics, the environment and by physical activity. A review of the current literature suggests that the undetermined specific origins of these traits and the fact that there is more genetic variation within populations than between them can prevent useful conclusions regarding their presence or absence in skeletal remains from being drawn (Tyrell 2000).

The presence of any non-metric traits is noted in the skeletal catalogue below (see Section 3).

2.8 Stature and Morphometric Analysis

Stature of adult individuals can be reconstructed from measurements of long bones of the skeleton. Since the long bones of sub-adults have not yet fully developed it is not possible to provide an estimate of stature for immature remains. Stature is the result of many factors including genetics and environmental influences (Floud *et al*. 1990), such as malnutrition and poor health. Height can be used as an indicator of health status and there is a wide range of literature on the relationships between height, health and social status. Estimated stature was calculated by taking the measurements of the individual long bones and using the formula provided by Trotter (1970). Variation in estimated stature can be up to 3cm.

Metric analysis of the long bones, cranium and mandible may also be undertaken on adult remains to provide comparative information on morphological variability.

Stature was estimated for SK(649) from the left femur and tibia, the most reliable long bones. Stature was calculated as being approximately 1.76m. This estimate is taller than the average for males from the Iron Age period, recorded as between 1.64m and 1.74m with averages of 1.68cm (Roberts and Cox 2003, p. 103).

A summary of the morphometric data is provided in the skeletal catalogue. Full recording can be found on the CD-Rom provided.

2.9 Skeletal Pathology

Palaeopathology is the study of diseases of past peoples and can be used to infer the health status of groups of individuals within a population as well as indicate the overall success of the adaptation of a population to its surrounding environment. Pathologies are categorised according to their aetiologies; e.g. congenital, metabolic, infectious, traumatic, neoplastic etc. (Roberts and Manchester 1997). Any pathological modifications to the bone are described. The size and location of any lesion is also noted. Distribution of lesions about the skeleton should be noted to allow diagnosis. A differential diagnosis for any pathological lesions should also be provided.

Details of pathological conditions observed in the Horse and Groom assemblage are noted in the skeletal catalogue below (see Section 3). In summary, several congenital or developmental anomalies were noted in the vertebrae and ribs as a suite of inter-related traits in SK(649). These

anomalies are generally asymptomatic and would not have led to any health implications for this individual.

2.10 Dental Pathology

Dental diseases include conditions that not only directly affect the teeth but also the soft tissue surrounding them, sometimes observable in changes to the underlying alveolar bone (Hillson 1986). Each condition can give an indication of different aspects of lifestyle and health of the individual. For example, caries is associated with diets high in sucrose content. The presence of calculus can inform us about dental hygiene whilst enamel hypoplastic defects testify to developmental stresses that an individual has undergone in childhood (Goodman and Armelagos 1985, Hutchinson and Larsen 1988, Dobney and Goodman 1991). The analysis of dental disease, therefore, not only informs us of specific oral conditions but provides complimentary data regarding overall health status and cultural practices.

A summary of dental pathology is provided in Section 3 below. Overall, generally minor but occasionally moderate calculus deposits were observed in SK(649), along with very minor hypoplastic defects in the tooth enamel. Neither caries, periodontal disease, ante-mortem tooth loss nor dental abscesses were observed.

2.11 AMS Dating

AMS dating was undertaken by SUERC (Scottish Universities Environmental Research Centre), AMS Faculty, Glasgow, on a fragment of right femur of SK(649) in order to ascertain a more precise date for the crouched burial. Calibrated age ranges were determined from the University of Oxford Radiocarbon Accelerator Unit calibration progam (OxCal4).

The results of the dating provided a radiocarbon age of 2146 +/- 33 years BP. At the 95.4% probability level, the calibrated dates returned were 235-87 calBC (66.1%) and 356-285 calBC (26.3%). The burial is, therefore, most likely to date to the later Middle Iron Age.

2.12 Stable Isotope Analysis

Isotope analysis was undertaken on SK(649) to ascertain evidence for origins and diet. Strontium (Sr) isotope analysis was carried out on the enamel of the first right maxillary premolar to assess

the individual's origins, while carbon (C13) and nitrogen (N15) isotopic analysis was undertaken on a sample of bone from the right femur to gain an insight into diet.

Strontium Isotope Analysis was also undertaken by SUERC in order to ascertain the geographical location of the individual during childhood (Laboratory Code: SUERC-63637 (GU39204)). Strontium isotope ratios in human dentition predominantly reflect the locality of grown or grazed foods consumed (Evans et al. 2012). The analysis here was based on tooth enamel of a first right premolar, indicating the geographical location of Sk[649] between the ages of approximately 2 and 5 years old (Slovak and Paytan 2011).

The Sr87/Sr86 ratio returned for Sk[649] was was 0.7151 +/- 0.0011. Bio-available Sr87/Sr86 ranges for the local area, situated on Oolitic Limestone, are 0.7076-7092 (Neil *et al*. 2016). Ratios obtained from the nearby early Neolithic site at nearby Hazelton North ranged from 0.70794 to 0.71120 (Neil *et al*. 2016). Furthermore, the value is very high for the British Isles as a whole and within the UK is only associated in areas of Precambrian sediments, such as in Northeast and Northwest Scotland, Dumfries and Galloway, and the Western Isles. Restricted locales of Precambrian geology are also present in central and northern Wales as well as in the Malverns and around the Welsh borders in Shropshire that could create local variations in the regional Sr87/Sr86 ratios. However, the ratio for SK[649] is much higher in contrast to the majority of currently reported values for the area (Chenery et al. 2010, Evans et al. 2010, Montgomery et al. 2006). Recent analysis of 263 Chalcolithic-Bronze Age Bell Beaker burials from throughout the UK identified a small number of individuals with similarly 'unusually high' ratios (0.7145+) compared to a sample of over 600 human enamel strontium samples from Britain. These were considered non-local and to have originated in Scandinavia due to the association of these values with ancient or granitic rocks that are rare in the rest of Europe (Parker Pearson et al. 2016). Similar values may also found outside of the UK in Brittany and in some areas of Scandinavia, as well as further afield in Europe, such as the Alps (Millard, pers. comm., Voerkelies 2010). High ratios have been reported in a handful of Iron Age individuals, such as from Cliff's End Farm, Isle of Thanet in Kent but again these values are rare. Further research on Sk[649] including oxygen isotope analysis may help to clarify the strontium result.

Stable Isotope Analysis undertaken as part of the AMS dating process for Sk[649] returned results of $\delta^{13}C$ relative to VPDB = -21.6‰ and $\delta^{15}N$ relative to air = 8.5‰. The C/N ratio was 3.3 (Laboratory Code: SUERC-63637 (GU39204)). Carbon isotope values are used to provide data

regarding dietary protein, whilst nitrogen isotopes can help to differentiate between marine and terrestrial sources of protein; since bone remodels over the course of an individual's lifetime, isotope values from bone reflect an individual's diet over the past few years of life (Tykot 2004). While the nitrogen value is typical of other Iron Age sites in England (See, for example Van Klinken *et al*. 2000 and Redfern *et al*. 2010), the carbon value is unusual and very low. Overall, the values generally indicate a diet low in protein from terrestrial sources, with no evidence of marine proteins. The carbon value falls outside of the general ranges reported from Iron Age sites in England, including the local assemblage at Kemerton Camp, Bredon Hill (Hurst, pers. comm.). The isotopic analysis suggests that the diet of SK(649) is more akin to the 'human vegan' diet values reported by Redfern *et al*. (2010) than a meat-based diet, though a small amount of animal protein consumption is evident from the nitrogen value. It should be noted that it is not possible to differentiate between animal proteins derived from meat and those derived from dairy products or eggs (Jay and Richards 2007).

Unfortunately, there is no comparable data from faunal samples to establish a baseline for the isotopic values, whereby local environmental conditions, which may create fluctuations in measurements of $\delta^{13}C$ and $\delta^{15}N$, can be evaluated (Müldner 2013). It is speculative as to whether the potentially non-local origin of Sk[649] has had any influence on the carbon and nitrogen values since it is not known at what age Sk[649] migrated to England. The variation in stable isotope values indicates that local environmental factors play a significant role in the values recorded (Jay and Richards 2007), meaning that values from different sites are not necessarily directly comparable and also may not directly reflect dietary intake. It is, therefore, very important to establish the 'baseline' isotopic values from the local faunal assemblage to make valid interpretations of human bone stable isotope analysis.

The dietary isotopic range of values from Kemerton Camp, Bredon Hill, are typical of other Iron Age assemblages and oxygen isotopes suggest only local migration of two individuals (Western and Hurst 2014). The extreme values of $\delta^{13}C$ and $\delta^{15}N$ reported by Parker Pearson et al. (2016) from amongst the Bell Beaker sample was suggested to possibly result from non-normative diets or mobility. From the archaeological evidence, it is generally believed that during the Iron Age, there was a high dependence on cultivated plants, such as cereal grasses and legumes, whereas the consumption of wild animals such as birds, fish and deer was negligible (Jones 1996, after Jay and Richards 2007). The contribution of freshwater fish and eels to the diet can be difficult to detect from isotopic signatures, however (Müldner 2013, Mays and Beaven 2012). Evidence of the consumption of freshwater aquatic foodstuffs is seemingly conspicuous by its

absence in several Iron Age isotopic studies, despite frequent occupation on or near the coast and major river systems, such as at Glastonbury Lake Village (Jay 2008). It is therefore possible that Sk[649] also consumed some freshwater aquatic foodstuffs but this was not detected by the stable isotope analysis.

Interestingly, analysis of the stable isotopes from the hair of 'Ötzi the Iceman', the naturally mummified male found in a mountain top glacier just inside Italy, indicated a diet close to that of a modern day vegetarian or vegan, with low carbon and nitrogen values (Macko et al. 1999). However, microscopic gut examination, analysing the last meal consumed before death, consisted of grain, moss, pollen, whipworm eggs and muscle fibres from meat, appearing to contradict the stable isotope results (Dickinson et al. 2000). Since the microgut analysis is based on only one meal, Macko et al. contended that the combined results overall suggest that meat consumption was sporadic and that perhaps this individual was an opportunistic meat consumer, while his staple diet consisted primarily of vegetarian or vegan foodstuffs (Netting 2001). More recent radiographic analysis, however, has led to the identification of gallstones and atherosclerosis (Gostner et al. 2011). The authors proposed that these pathological conditions suggest a higher, long term intake of meat based on their clinical association with high cholesterol levels, supporting a previously proposed theory that the Iceman was a semi-nomadic herdsman. This example illustrates the difficulty in interpreting dietary intake from stable isotopes alone and that more research is required to clarify the role of numerous variables in stable isotope analyses.

3. Conclusion

Excavation at the site of the Horse and Groom Inn, Boughton-on-the-Hill in Gloucestershire revealed the remains of two interred, articulated individuals dating to the middle Iron Age as well as a small number of disarticulated neonate bones from three further contexts. Overall, a minimum number of four individuals were present, consisting of one adult and three sub-adults.

The first individual, SK(649) was a male young-middle adult, aged around 25-40 years at death, of approximately 1.76m in stature. The remains of this individual were well preserved and over 75% complete, allowing for a full examination for pathological changes. Several developmental anomalies were present in the spine relating to a cranial shift of the developmental borders,

resulting in the presence of a fused cervical rib and a rudimentary 12th rib. These changes are likely to have had no clinical symptoms. Schmorl's nodes were also noted in the vertebral body surfaces of T6-T11. Again, these are of little clinical significance, though they do indicate vertebral disc degeneration (Salter 2000, p. 274). Calculus was present on the majority of the dentition, with moderate deposits on the lingual surfaces of the anterior dentition. Overall, however, the dental health of this individual was good with no evidence for caries, dental abscess, ante-mortem tooth loss or periodontal disease.

The second individual represented by SK(649) was an infant. Unfortunately, although the remains were in good condition, they were <25% complete. Nonetheless, analysis of the dental development and metric analysis of the maxilla enabled an age at death of approximately 1.2-1.4 months. No pathological changes were observed. This was also true of SK(473), although this individual was only represented by three incomplete long bones and was therefore <25% complete. The bones were well preserved and metric analysis of the remains suggests that they belonged to a neonate or possibly a young infant. There was no repetition of skeletal elements present and it is, therefore, likely that the elements recovered from (473) belong to the same individual despite being seemingly deposited in a disarticulated state. This may also be the case for those elements recovered from (490), a similarly incomplete set of skeletal elements deposited in a disarticulated state confirmed as those belonging to a neonate. Context (739) contained only a single disarticulated element which again appeared to be neonate/young infant.

Although numerous Iron Age sites produce cremation burials, reports of inhumations from the period are rare. This is particularly true of Gloucestershire, where only a handful of sites have produced inhumated human remains dating to the Iron Age (King et al. 1996). Most human remains from the period are thought to date to the later period and are found in a dispersed and disarticulated state, scattered about features such as paved surfaces, ditches, pits and post-holes at hillforts, such as at the nearby Kemerton Camp, Bredon Hill (Western and Hurst 2014) and across settlement sites (Cunliffe 2005). However, pits containing articulated human remains, also dating to the late Iron Age, have been found at Maiden Castle and Danebury (Harding 2012) as well as at Salmonsbury Camp, near Bourton-on-the-Water, Gloucester (Davenport 2010). Here, seven pits, thought to have been originally used for grain storage contained human remains (http://www.pastscape.org.uk/hob.aspx?hob_id=330369&sort=2&type=hillfort&rational=a&clas

s1=None&period=None&county=None&district=None&parish=None&place=&recordsperpage=10&source=text&rtype=&rnumber=&p=35&move=n&nor=889&recfc=0). Three of the burials contained crouched or flexed adult remains while a further two pits contained infant remains.

More recent excavations have led to the discovery of similar burials that date to the middle Iron Age. At Yarnton, Oxfordshire, excavations in 1996 revealed a cemetery comprising of 35 burials, all of which were unaccompanied by grave goods and in which the majority of the remains had been placed in a crouched position in shallow pits (Hey et al. 1999). Generally the burials were orientated on a north-south alignment. Both adults and sub-adults were present, although there were no neonate burials. Radiocarbon dating of a sample of these burials confirmed dates of the middle Iron Age. Similar contemporary examples have been found at Suddern Farm, near Danebury, where 28 burials were discovered (including neonates), at Owslebury, Hants and a smaller assemblage of burials at Cockey Down, near Salisbury (Hey et. al 1999). Hey et al. (1999) suggest that some middle Iron Age burials, therefore, may remain undetected through a lack of dating though they also hypothesise that burials from this period may be located on the peripheries of settlement areas that remain unexcavated. This latter observation is also supported by King et al. 1996, who suggest that earlier Iron Age burials are more commonly outside settlement boundaries whereas later burials are within them.

Local examples of middle Iron Age burials have been found at Kemble, Gloucestershire, where a group of five sub-circular pits were excavated at West Hay Field, two of which contained inhumated human remains (King et al. 1996). Both articulated crouched burials were males, one young adult (17-25 years old) and one middle adult (25-35 years old). The young adult male had been buried in a prone, crouched position and had been sealed into the pit under a thick slab of limestone. A horse skull was also discovered in the pit. The second male had also been placed in a crouched position but was not accompanied by any grave goods, though sherds of pottery were present in the backfill. The archaeological evidence suggested that both pits had been re-used for burials; a second cut associated with the interred remains was detected in the first pit and the second pit contained a primary fill not associated with the skeletal remains. A similar crouched burial of a young adult female dating to the middle Iron Age was also found in Boughton-on-the-Water (Davenport 2010). One further crouched burial of a middle aged female was excavated at Bourton-on-the-Water at the site of Cotswold School, AMS dated to 394-207 cal. BC (Middle Iron Age), seemingly marking the end of activity at the site during the Iron Age period (Hart et al. 2010). The burial was located in the backfill of a partially infilled ditch

encompassing an Iron Age settlement. In addition, three pits containing articulated human remains at the site had also been excavated in 2003, including three female adults in the flexed position (Wills 2004).

Although rare, when inhumated human remains dating to the Iron Age are discovered these often consist of the remains of sub-adults and infants. Some of these sub-adults have been found deposited in the middle or upper fills of large pits while others had been deposited in a pit of their own, such as at Maiden Castle and Danebury (Harding 2012). The remains of four infants and young children were revealed by excavations near Aves, Ditch in Oxfordshire dating from the middle to late Iron Age (Hart *et al*. 2010). Here, the sub-adults were interred as secondary deposits in pits or in one of the enclosure ditches. Some of these deposits consisted of partial remains. Twenty eight infant human bone finds were discovered at Gravelly Guy, near Stanton Harcourt, Oxfordshire, consisting of 35.9% of all the human bone deposits, though only 3-9% of pits in any phase contained human bone (Hart *et al*. 2010).

Many of these infant and neonate burials date to the late Iron Age; reports of similar burials dating to the middle Iron Age are rare. Comparable to that discovered at the Horse and Groom Inn reported here, one neonate burial dating to the Middle Iron Age was discovered at the base of an upper fill of a pit at Latton Lands, North Wiltshire (Geber, n.d.). The neonate had been placed in a crouched position but was aligned east-west with the head facing north. A large group of contemporary sub-adult remains were excavated at Winnall Down, comprising of 10 infants and 2 children (Hey et al. 1999).

The discovery of a well preserved crouched inhumation burial at the Horse and Groom site, confirmed by independently to date to the Middle Iron Age, in addition to neonate and infant remains has provided a valued opportunity to expand our archaeological knowledge of not only Iron age burial practice but also of migration and lifestyle during the period. The discovery of the non-local origins of SK(649) and unusual diet suggests that this individual may have acquired special social status during his lifetime, positive or negative, and perhaps this is one of the motivations behind this seemingly isolated burial. Future research comparing the osteological observations of this individual to contemporary burials found in the vicinity should provide fascinating insights and help to fill the gaps in our current understanding of Middle Iron Age activity in Gloucestershire.

4. Catalogue of Human Remains

The results of the osteoarchaeological analysis are presented below in numerical order according to each individual context. Due to the small sample size, disease prevalence rates have not been calculated but prevalence rates reported in the literature for other, contemporary sites is referred to. A full inventory and recording of the human skeletal remains can be found on the MS Access database.

SK649 (Burial pit cut [652])

Inventory: Complete cranium (both orbits observable) but fragmented; no lacrimal bones; complete mandible; C1-L6 vertebrae; 11 left ribs; 11 right ribs; 1 rudimentary 12th rib; Complete but fragmented humerii, radii and ulnae; Complete femora, tibiae and fibulae (right femur fragmented); Complete right ilium; Fairly complete left ilium, ischium, no pubis; Complete sacrum, some fragmentation; Incomplete scapulae; Complete clavicles; Complete patellae; No coccyx; Right scaphoid, capitate, hamate and left hamate; All metacarpals; 24 hand phalanges; All tarsals except the right second cuneiform and left navicular; all metatarsals except the right third; 15 foot phalanges.

Completeness: 75%>

Condition: Good (Grades 1 and 2)

Dental Inventory and Pathology:

649	*Observable dentition*	*Observable tooth sockets*	*Ante-mortem loss*	*Caries*	*Calculus*	*Periodontal disease*	*Enamel hypoplasia*	*Abscess*
n	32	32	0	0	25	0	4	0

Calculus was present on the majority of the dentition, with moderate deposits on the lingual surfaces of the anterior dentition.

Age Assessment: Age: 25-40. Right Pubic Symphysis stage 3-4 (28-35); Auricular surface stage: Left 4 (35-39), Right 3 (30-34); Dental Attrition Left and Right stage 3 (20-30).

Sex Determination: Male. Pelvic and cranial morphology, male; Metric data, male

Stature: 1.76m (Femur and Tibia)

Platymeric Index: 67.5 (Platymeric)

Platycnemic Index: 68.1 (Mesocnemic)

Non-Metric Traits: Femoral Plaque L and R; Tibial Squatting Facet L and R.

Skeletal Pathology: Six lumbar vertebrae. Sacralisation of L6, which also has a cleft arch. Cervical rib present at C7 that is fused to the vertebra on the left hand side (See Plate 2). Only 11 true thoracic vertebrae present; no rib facets on on 'T12'/L1 and only a rudimentary 12th rib is present (See Plate 3). All these changes in the spine and ribs are segmental anomalies related to a cranial border shift during the development of the vertebral column (Barnes 1994, p.29). As a result of the cranial shift of the developmental borders, the vertebrae take on the characteristics of the vertebrae immediately inferior to them in a normal spine, though in a rudimentary form. None of the changes have any clinical symptoms. Schmorl's nodes were present in the vertebral bodies of T6-T11.

Plate 2: *Cervical Rib fused to the left transverse process of C7*

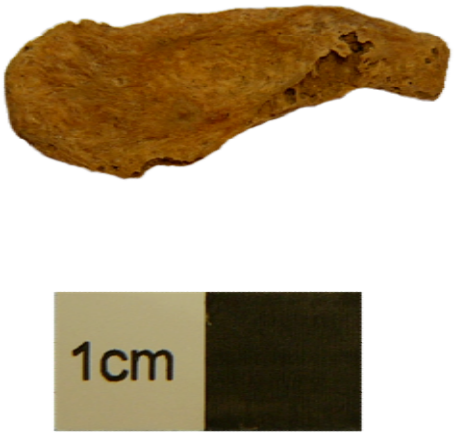

Plate 3: *Rudimentary 12th Rib*

SK(627) (Backfill of Burial Pit Cut [652])

Inventory: Large cranial fragments, mainly flat bones from the right hand side (both orbits observable); One right rib and two left ribs; one right thoracic vertebral arch.

Completeness: <25%

Condition: Good (Grades 1).

Dental Inventory and Pathology:

113	*Observable Dentition*	*Observable Tooth Sockets*	*Ante-mortem Loss*	*Caries*	*Calculus*	*Periodontal Disease*	*Enamel Hypoplasia*	*Abscess*
n	5	0	-	-	-	-	0	-

Unerupted deciduous tooth crowns; maxillary and mandibular 1st right incisors, mandibular 2nd right incisor; maxillary and mandibular 1st right molars.

Age Assessment: Infant. Dental development indicates an age of 1.2-1.4 months, with a total age range of 0-6 weeks (postnatal). Metric analysis of the maxilla suggests an age of 40 weeks i.e. full term neonate. Total a

Sex Determination: Unobservable

Stature: Unobservable

Platymeric Index: Unobservable

Platycnemic Index: Unobservable

Non-Metric Traits: Unobservable

Skeletal Pathology: None

SK(473) [Pit Cut 475]

Inventory: Distal half right humerus, distal half left radius, distal half left femur.

Completeness: <25%

Condition: Fair (Grades 0,1).

Dental Inventory and Pathology:

473	*Observable Dentition*	*Observable Tooth Sockets*	*Ante-mortem Loss*	*Caries*	*Calculus*	*Periodontal Disease*	*Enamel Hypoplasia*	*Abscess*
n	0	0	0	0	0	0	0	0

Age Assessment: Age: Metric analysis distal width of humerus: 40+ weeks; distal width of femur: 40 weeks.

Sex Determination: Unobservable

Stature: Unobservable

Platymeric Index: Unobservable

Platycnemic Index: Unobservable

Non-Metric Traits: Unobservable

Skeletal Pathology: None

SK(490)

Inventory: Cranial fragments (frontal? squame and sphenoid); Complete right humerus,

Completeness: <25%

Condition: Fair (Grades 0,1).

Dental Inventory and Pathology:

490	*Observable Dentition*	*Observable Tooth Sockets*	*Ante-mortem Loss*	*Caries*	*Calculus*	*Periodontal Disease*	*Enamel Hypoplasia*	*Abscess*
n	0	0	0	0	0	0	0	0

Age Assessment: Age: Metric analysis length of humerus: 40 weeks; width of humerus: 38-40 weeks.

Sex Determination: Unobservable

Stature: Unobservable

Platymeric Index: Unobservable

Platycnemic Index: Unobservable

Non-Metric Traits: Unobservable

Skeletal Pathology: None

SK(739) (Disarticulated)

Inventory: Distal half right humerus

Completeness: <25%

Condition: Fair (Grades 0,1).

Dental Inventory and Pathology:

739	*Observable Dentition*	*Observable Tooth Sockets*	*Ante-mortem Loss*	*Caries*	*Calculus*	*Periodontal Disease*	*Enamel Hypoplasia*	*Abscess*
n	0	0	0	0	0	0	0	0

Age Assessment: Unobservable

Sex Determination: Unobservable

Stature: Unobservable

Platymeric Index: Unobservable

Platycnemic Index: Unobservable

Non-Metric Traits: Unobservable

Skeletal Pathology: None

5. Acknowledgements

Osteological analysis and report writing were carried out by Gaynor Western of Ossafreelance. Thanks are due to Chiz Harward of Urban Archaeology and Cornelius Barton of L-P Archaeology and Derek Hurst (Worcester Archaeology) for the provision of contextual data as well as to

Elaine Dunbar (SUERC) and Andrew Millard (University of Durham) for advice on interpretation of the stable isotope results.

REFERENCES

Barnes, E.	1994	*Developmental Defects of the Axial Skeleton in Paleopathology.* Colarado, USA: University Press of Colarado.
Bass, W. M.	1995	*Human Osteology; A Laboratory and Field Manual*. Columbia, USA: Missouri Archaeological Society, Inc.,
Brickley, M., and McKinley, J. I. (eds)	2004	Guidelines to Recording Human Remains. *IFA Paper No. 7* in association with BABAO.
Brooks, S. T. and Suchey, J. M.	1990	Skeletal Age Determination Based on the Os Pubis: A Comparison of the Acsadi-Nemeskeri and Suchey-Brooks Methods. In *Human Evolution* 5: 227-238
Buikstra, J. E. and Ubelaker, D. H.	1994	*Standards for Data Collection from Human Skeletal Remains.* Arkanasas, USA: Arkansas Archaeological Survey Research Series No. 44.
Chenery, C., Müldner, G., et al.	2010	Strontium and stable isotope evidence for diet and mobility in Roman Gloucester, UK. *Journal of Archaeological Science* 37(1): 150-163.
Cox. M.	2000	Ageing adults from the skeleton. In *Human Osteology in Archaeology and Forensic Science* (eds) M. Cox and S. Mays. Greenwich: Medical Media, Pp. 289-305.
Cunliffe, B.	2005	*Iron Age Communities in Britain: An Account of England, Scotland and Wales from the Seventh Century BC until the Roman Conquest.* Abingdon, Oxon: Routledge (4th edition).
Davenport, P.	2010	New Changing Block, Cotswold School, Borton-on-the-Water, Gloucestershire. Unpublished Report Cotswold Archaeology

		10111.
Dickinson, J.,	2000	The Omnivorous Tyrolean Iceman: Colon Contents (meat, cereals, pollen. Moss, whipworm) and Stable Isotope Analysis. *Philosophical Transactions of the Royal Society of London* 355: 1843-1849.
Dobney, K. and Goodman, A.	1991	Epidemiological Studies of Dental Enamel Hypoplasia in Mexico and Bradford; Their Relevance to Archaeological Skeletal Studies. In Bush, H. and Zvelebil, M. (eds) *Health in Past Societies. Biocultural interpretations of human remains in archaeological contexts.* Oxford: Tempus Reparatum, British Archaeological Reports. International Series 567: 101-13.
English Heritage	2002	*Human Bones from Archaeological Sites: Guidelines for producing assessment documents and analytical reports*. English Heritage, Centre for Archaeology Guidelines.
Evans, J., Montgomery, J., Wildman, G. and Boulton, N.	2010	Spatial Variations in biosphere $^{87}Sr/^{86}Sr$ in Britain. J. Geol. Soc. 157: 1-4.
Evans, J., Chenery, C. and Montgomery, J.	2012	A Summary of Strontium and Oxygen Isotope Variation in Archaeological Human Tooth Enamel Excavated from Britain. *J. Anal. At. Spectrom*. 27: 754-764
Floud, R., Wachter, K. and Gregory A.	1990	*Health, Height and History: Nutritional Status in the United Kingdom 1750-1980.* Cambridge: Cambridge University Press.
Geber, J.	n.d.	Osteological Analysis of the Human Remains from Latton Lands, North Wiltshire. http://archaeologydataservice.ac.uk/archiveDS/archiveDownload?t=arch-876-1/dissemination/pdf/specialist_reports/Human_Bone.pdf Accessed 07/04/14.
Goodman, A. and Armelagos, G.	1985	Factors Affecting the Distribution of Enamel Hypoplasias Within the Human Permanent Dentition. In *Am. J. Phys. Anth.*68: 479-493
Harding, D.	2012	Iron Age Hillforts in Britain and Beyond. Oxford: Oxford University Press.

Hart, J., McSloy, E.R., Warman, S. and Mudd, A.	2010	Later Iron Age Settlement and Burial near Aves Ditch: Excavations on the Angelinos Pumping Station to Ardley Reservoir Mains Pipeline Reinforcement. In *Oxoniensia* 75, 133-163.
Harward, C.	2011	Land adjacent to the Horse and Groom Inn, Bourton-on-the-Hill, Gloucestershire: Archaeological Evaluation. Cotswold Archaeology: CA Typescript Report No 11237. doi:10.5284/1012238
Henderson, J.	1987	Factors Determining the State of Preservation of Human Remains. In Boddington, A., Garland, A. N. and Janaway, R. C. (Eds) *Death, Decay and Reconstruction: Approaches to Archaeology and Forensic Science*. Manchester : Manchester University Press,.
Hey, G., Bayliss, A. and Boyle, A.	1999	Iron Age Inhumation Burials at Yarton, Oxfordshire. In *Antiquity*: 73(381), 551-562.
Hillson, S.	1986	*Teeth.* Cambridge: Cambridge University Press.
Hutchinson, D. L. and Larsen, C. S.	1988	Determination of Stress Episode Duration from Linear Enamel Hypoplasias: A Case Study from St. Catherines Island, Georgia. In *Human Biology* 60: 93-110.
Jay, M.	2008	Iron Age Diet at Glastonbury Lake Village: The Isotopic Evidence for Negligible Aquatic Resource Consumption. Oxford Journal of Archaeology 27(2): 201-216.
Jay, M. and Richards, M.	2007	British Iron Age Diet: Stable Isotopes and other Evidence. *Proceedings of the Prehistoric Society.* 73: 169-190
King, R., Barber, A. And Timby, J.	1996	Excavations at West Lane, Kemble: An Iron-Age, Roman and Saxon Burial Site and a Medieval Building. In *Transactions of the Bristol and Gloucestershire Archaeological Society.* CXIV: 15-54.
McKinley, J., Leviers, M., Schuster, J., Marshall, P., Barclay, A. and Stoodley, N.	2014	*Cliffs End Farm, Isle of Thanet, Kent: A Mortuary and Ritual Site of Bronze, Iron Age and Anglo-Saxon Period*. Wessex Archaeology Ltd. Salisbury.

Lovejoy, C., Meindl, T., Pryzbeck, T. and Mensforth, R.	1985	Chronological Metamorphosis of the Auricular Surface of the Ilium: A New Method for the Determination of Age at Death. In *American Journal of Physical Anthropology* 68:15-28
Macko, S., Lubec, G. and Teschler-Nicola, M.	1999	The Ice Man's diet as Reflected by the Stable Isotopic Composition of his Hair. *FASEB Journal* 13: 559-562.
Mays, S. and Beaven, N.	2012	An Investigation of Diet in Early Anglo-Saxon England using Carbon and Nitrogen Stable Isotope Analysis of Human Bone Collagen. *Journal of Archaeological Science* 39: 867-874.
Miles, A. E. W.	1963	The Dentition in the Assessment of Individual Age in Skeletal Material. In Brothwell, D. R. (ed) *Dental Anthropology*, pp. 191-209 Oxford: Pergamon.
Montgomery, J., Evans., and Wildman, G.	2006	Sr-87/Sr-86 Isotope Composition of Bottled British Mineral Waters for Environmental and Forensic Purposes. *Applied Geochemistry* 21(10): 1626-1634.
Müldner, G.	2013	Stable Isotopes and Diet: Their Contribution to Romano-British Research. *Antiquity* 87 (335): 137-149.
Neil, S. Evans, J. Montgomery, J. and Scarre,C.	2016	Isotopic Evidence for Residential Mobilty of Farming Communities During the Transition to Agriculture in Britain. *Royal Society Open Science* 3:150522. DOI: 10.1098/rsos.150522.
Netting, J.	2001	The Iceman ate-eth meat. *Nature.* Published online 2 January 2001. doi:10.1038/news001228-7
Parker Pearson, M., Chamberlain, A., Jay, M., and Richards, M.	2016	Beaker People in Britain: Migration, Mobility and Diet. Antiquity (90), Issue 351, Pp. 620-637.
Redfern, R., Hamlin, C. and Athfield, N.	2010	Temporal Changes in Diet: A Stable Isotope Analysis of Late Iron Age and Roman Dorset, Britain. *Journal of Archaeological Science* 27:1149-1160.
Roberts, C. and Cox, M.	2003	*Health and Disease in Britain from Prehistory to the Present Day*. Stroud: Sutton Publishing Ltd.
Roberts, C and Manchester, K.	1997	*The Archaeology of Disease.* Stroud: Sutton Publishing Ltd.

Salter, R.	1999	*Textbook of Disorders and Injuries of the Musculoskeletal System*. Maryland, USA: Williams and Wilkins (3rd ed).
Schaefer, M., Black, S. and Scheuer, L.	2009	*Juvenile Osteology: A Laboratory and Field Manual.* London: Elsevier Academic Press.
Scheuer, L and Black, S.	2004	*The Juvenile Skeleton.* London: Elsevier Academic Press.
Slovak, N. M. And Paytan, A.	2011	Application of Sr Isotopes in Archaeology. In Baskaran, M. P. (ed) *Handbook of Environmental Isotope Geochemistry, Pp.* 743-768. Berlin, Heidelberg: Springer.
Smith, B.H.	1991	Standards of Human Tooth Formation and Dental Age Assessment. In Kelley, M & Larsen , C. S. (eds) *Advances in Dental Anthropology*. New York: Wiley-Liss, Pp 143-168.
Stuart-Macadam, P.	1991	Anaemia in Roman Britain. In H. Bush and M. Zvelebil (eds) *Health in Past Societies. Biocultural interpretations of human remains in archaeological contexts.* Oxford, Tempus Reparatum, British Archaeological Reports. International Series 567, Pp101-13.
Tafuri, M., Craig, O., Canci, A.	2009	Stable Isotope Evidence for the Consumption of Millet and Other Plants in Bronze Age Italy. *American Journal of Physical Anthropology* 139:146-153.
Trotter, M.	1970	Estimation of Stature from Intact Limb Bones. In Stewart, T. D. (ed.) *Personal Identification in Mass Disasters.* Washington DC: Smithsonian Institution, Pp.71-83.
Tykot, R.	2004	Stable Isotopes and Diet: You Are What You Eat. *Proceedings of the International School of Physics* "Enrico Fermi" Course CLIV, M. Martini, M. Milazzo and M. Piacenetini (Eds). IOS Press, Amsterdam.
Tyrell, A.	2000	Skeletal non-metric traits and the assessment of inter- and intra-population diversity: Past problems and future potential. In *Human Osteology in Archaeology and Forensic Science* (eds) M. Cox and S. Mays, Greenwich: Medical Media, Pp 289-305.
Ubelaker, D.	1989	*Human Skeletal Remains*. 2nd ed. Taraxacum Press, Washington

		D.C. (2nd Edition)
Van Klinken, G., Richards, M. and Hedges, R.	2000	An Overview of Causes for Stable Isotopic Variations in Past European Human Populations: Environmental, Ecophysiological and Cultural Effects. In Ambrose, S. and Katzberg, A. (Eds).*Biogeochemical Approaches to Palaeodietary Analysis*. Kluwer Academic/Plenum Publishers, New York, pp. 39-63.
Vigorita, V. J.	2008	*Orthopaedic Pathology*. London : Wolters Luwer/Lippincott Williams and Wilkins (2nd Edition).
Voerkelius S., Lorenz, G., Rummel S., Quétel C., Heiss G., Baxter M., Brach-Papa C., Deters-Itzelsberger P., Hoelzl S., Hoogewerff J., Ponzevera E., Van Bocxstaele M. and Ueckermann H.	2010	Strontium isotopic signatures of natural mineral waters, the reference to a simple geological map and it potential for authentification of food. *Food Chemistry* 118: 933-940.
Walker, P., Bathurst, R., Richman, R., Gjerdrum, T and Andrushko, V.	2009	The Cause of Porotic Hyperostosis and Cribra Orbitalia: A Re-appraisal of the iron deficiency-anemia hypothesis. *In Amercian Journal of Physical Anthropology* 139: 109-125.
Western, A. G. and Hurst, J. D.	2014	"Soft Heads": Evidence for Sexualized Warfare during the later Iron Age from Kemerton Camp, Bredon Hill. In Knüsel, C. and Smith, M. J. (eds). *The Routledge Handbook of the Bioarchaeology of Human Conflict.* Abingdon, Oxon: Routledge, Pp. 161-184.
Wills, J.	2004	Archaeological Review No.28, 2003. *Transactions of the Bristol and Gloucestershire Archaeological Society.* 122:173-192.

THE ARCHIVE

Type	No	Type	No
Skeleton Recording Form A	5	Skeleton Recording Form L	0
Skeleton Recording Form B	1	Skeleton Recording Form P	4
Skeleton Recording Form D	1	Skeleton Recording Form Q	4
Skeleton Recording Form E	1	Skeleton Recording Form R	4
Skeleton Recording Form F	3	Skeleton Recording Form S	0
Skeleton Recording Form G	1	Skeleton Recording Form V	0
Skeleton Recording Form H	1	Skeleton Recording Form W	0
Skeleton Recording Form I	1	Articulated Inhumated Db	1
Skeleton Recording Form J	1		
Skeleton Recording Form K	1		

COPYRIGHT