The Iron Age human bone

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Introduction

The remains of seven articulated burials dating to the Early–Middle Iron Age were recovered within shallow pits or graves: two from within the stake circle (Harding 1987), and the remainder from shallow pits or graves within Trenches MFP4, MFP6 and MF36. In addition, 42 Iron Age contexts (mostly within pits) and nine topsoil contexts in a total of 12 trenches contained disarticulated human remains, with the greatest concentration being in Trench MFP4, and then in MFP2 and MFP3. The minimum number of individuals (MNI) represented by these disarticulated remains is 26. These largely occurred as isolated bones, but in four cases, multiple elements from a single context or adjacent features suggest that these comprise the disturbed remains of four articulated burials truncated by ground reduction and ploughing activities.

Postmortem modification in the form of canid gnawing, deliberate breakage and/or fine cutmarks is probable in disarticulated limb bones from three Iron Age features whilst further cutmarks were observed on human bone within three Romano-British layers of the arena floor, which may well be redeposited from Iron Age contexts but are currently not radiocarbon dated.

Methodology

Osteological analysis of the articulated remains was undertaken following accepted standards (Mitchell and Brickley 2017; Buikstra and Ubelaker 1994). Age was estimated using AlQahtani *et al.* (2010), Brooks and Suchey (1990), Buckberry and Chamberlain (2002), Meindl and Lovejoy (1985) and Schaefer *et al*. (2009). Adults were sexed using Buikstra and Ubelaker (1994), Ferembach *et al.* (1980) and Bass (1995). No attempt to sex immature individuals was made, in line with accepted practice. However, the biological sex of all but one articulated individual was determined by DNA studies (see Armit *et al*. this website). Non-metric trait recording followed Berry and Berry (1967) and Finnegan (1978). Stature was estimated from regression equations devised by Trotter and Gleser (1958) and Trotter (1970). Cortical bone condition was scored using McKinley's (2004) five-point scale.

Age categories used below are as follows:

Foetus	<36 weeks *in utero*
Perinate	36 weeks *in utero*–1 m
Younger infant	1 m–2 yr
Older infant	2–5 yr
Juvenile	6–12 yr
Adolescent	13–17 yr
Young adult	18–25 yr

Prime adult	26–35 yr
Mature adult	36–45 yr
Older adult	45+ yr
Immature	<18 yr
Adult	>18 yr

The disarticulated bone was not recorded in detail, with analysis focussed on establishing a minimum number of individuals (MNI) represented (with element identification, age and sex estimation being paramount). However, general bone condition, pathological lesions and postmortem treatment were noted but not recorded in detail. MNI in each trench was determined by repeating bone elements and age-at-death. Although this cannot be proven, it was assumed that the spatial spread of disarticulated elements of any one individual was fairly restricted, and hence, remains in different trenches are assumed to be part of separate individuals, but this assumption may well be spurious.

Results

Bone condition and completeness

Cortical bone condition of the articulated remains is good to very good (Stages 1–2), with only occasional patchy root etching present. The most variation is present in skeleton 21, in which the radii, humeri and some hand bones show cracking and splinting resembling splintered wood, but the remainder of the skeleton is fair to well preserved (Stages 2–3). Whilst this upper limb damage may suggest weathering (from exposure to the elements), similar changes do occur in waterlogged or damp environments rich in organic matter.

Elements sampled for isotope analysis (a complete femoral diaphysis and mandible) from all but the foetus, were missing at the time of the osteological analysis. The skeletal completeness given in Table 1 reflects only the remains examined by the author. Despite these missing elements, skeletal completeness is high, with all but the foetus being between 70–85% complete. Approximately 30% of the foetus was present at analysis, but osteological recording by Shirley Jarmin in Harding (1987) includes diaphyseal length measurements of 10 major long bones, indicating that originally these complete elements were recovered, but have been lost in the intervening four decades since excavation. Bone fragmentation of the assemblage is generally low (mostly recent dry bone excavation damage), except for the crania, which showed considerable post-depositional breakage, probably from soil pressure on the thin immature cranial vaults.

Although there is more variation in bone preservation within the disarticulated assemblage (possibly reflecting more variable conditions of pre- and postmortem deposition and secondary manipulation), most are fairly well to very well preserved (McKinley Grades 1–3). This included the many friable perinate and infant bones. There is no evidence of fissuring, splinting or flaking characteristic of weathering when bone is left exposed to the elements. Evidence of postmortem manipulation is discussed below.

Demography

The minimum number of Iron Age individuals is estimated as 39 (Table 2): seven articulated burials, four probably disturbed burials (within ditch 2006 and pits 4113, 4167 and 4297), and 22 others from within Iron Age features, and six as stray elements within the topsoil of six trenches (unstratified).

The articulated assemblage comprises seven young individuals: one 36–37 week old perinate and an adolescent from within Harding's stake circle, and two juveniles (aged 8–10 years), two younger adolescents, an older adolescent/young adult and a young adult aged 20–25 years from Trenches MFP4, MFP6 and MF36 (Tables 1 and 2). The presence of the perinate, and the disarticulated remains of at least 10 foetus or perinates (see below) is not surprising, newborns being relatively common in Iron Age pit burials. For example, 18 of the 22 articulated burials from Gravelly Guy were this age (Lambrick and Allen 2004), whilst others were found at Castle Hill, Wittenham (Allen *et al.* 2010), Crab Hill, Wantage (Allen *et al*. 2022), Grove Road, Harwell (Thompson 2018) and Childrey Warren, Childrey (Guarino and Barclay 2023), all Oxfordshire. Perinatal remains in these contexts probably reflect the obstetric risks in later pregnancy and childbirth, and the dangers of life outside the womb (e.g., inadequate nutrition or exposure to infection) in the immediate period *post-partum*, but their prominence in the burial record may also reflect ideological and/or emotional responses to the death of the very young.

What is less usual in the Marcham assemblage is that all the individuals are aged <25 years, with four of the seven being juveniles, adolescents or on the cusp of adulthood– the age cohorts that usually form the smallest proportion of normal attritional burial assemblages. This young age distribution differs from the patterning in a collation of 43 pit burials from diverse Iron Age sites across Oxfordshire, in which there is only one juvenile and one adolescent to 17 adults, of which at least 10 are aged >35 years, Table 3. Although this may suggest a deliberate selection for burial of the young at Marcham, the sample is too small for interpretation.

In contrast, there is greater age diversity within the disarticulated assemblage (including in the topsoil), the youngest being two foetuses of 32–33 weeks gestation, and the oldest, an older adult (Table 2). A total of 20 (62.5%) are immature ranging from two 32–33 week foetuses, a large cohort of perinates and perinates/infants in the first year of life, three infants, one infant/juvenile, two juveniles, two juvenile/adolescent (10–14 years) and one adolescent. Six adults could not only be aged more specific than >18 years, but the remaining five were evenly distributed from young to older adulthood.

DNA analysis reveals that three of the articulated Marcham burials are males and three females (the perinate was not analysed and hence, sex is unknown). This even sex distribution is echoed in a collation of 15 sexed pit burials from 10 other sites in Oxfordshire (eight males; seven females), Table 3. Both suggest that biological sex was not an important criterion in the selection for undisturbed pit burial in the region. Only one disarticulated

pelvis could be sexed with any certainty (male), and two others were tenuously sexed as male based only on robustness of build.

Metrics

Stature is widely used as a yardstick for the general health of individuals and populations, as normal longitudinal growth in individuals may be slow or stop during episodes of nutritional stress or disease in the growing years, and if this is sustained, may result in permanent stunting and reduced stature. However, attainment of final stature is also very influenced by the genetic potential in each individual (Floud *et al.* 1990, 18), and thus, final stature is often the result of the interplay of these intrinsic and extrinsic factors.

Only two Marcham individuals were mature enough to estimate final stature: adult female (SK25) was 1.54 m (5' 1") tall, and adolescent/adult male SK21 (calculated from the fully fused tibial length) was 1.73 m (5' 8"). The former was considerably shorter than the national average stature of 1.62 m in females in this period (Robert and Cox 2003, 248), whilst the latter is much taller than the mean of 1.68 m in Iron Age British males (*ibid.*). The former was also much shorter than nine females (mean 1.59 m or 5' 3"; range 1.54–1.67 m), and the latter much taller than the mean stature of five males (1.67 m or 5' 6", range 1.59–1.7 m) from diverse Iron Age sites in Oxfordshire. Although female SK25 was suffering a systemic illness at the time of her death (see below), there is little skeletal evidence (with the exception of minor dental enamel hypoplasia), to support a picture of chronic childhood ill health as the root cause of her short stature, although admittedly the timing of stress events with the variable tempo of growth has significant influence on final stature attainment. Being non-local, her lower stature may reflect different genetic influences to Oxfordshire females, although admittedly, the comparative sample is very small.

Non-metric traits

Non-metric traits are anatomical variations that confer no significant adaptive advantage on the individual. Some are inherited, whilst others are the result of habitual physical activities, or a combination of intrinsic and extrinsic factors. In keeping with accepted practice, non-metric traits were not systematically recorded in non-adults, as the skeletons of these individuals are still developing. However, those traits that had already developed are given here, plus those noted in the two adults (Table 1).

Slight shovelling of the incisors is present in the second upper incisors of individuals SK24 and SK26. A common variant of lambdoid ossicles (small bones within the lambdoid suture at the back of the cranium) were noted in four individuals, with female SK25 also showing an ossicle at lambda and occipital bunning, and adolescent male SK19, a probable parietal notch bone. Triple zygomatic foramina are present in juvenile female SK26 and the male from the stake circle. Vestigial twelfth ribs (unusually small) are present in adult female SK25.

The upper left second deciduous molar was retained beyond the normal age of shedding in adolescent SK19, its space within the dental arcade causing the erupting second premolar to be displaced lingually.

Dental pathology

There is a total of 96 permanent teeth in the articulated individuals (of which 84 had fully erupted), 92 permanent dental sockets or tooth spaces, and 16 deciduous teeth and 25 sockets. One caries was noted in the deciduous dentition. There are no caries, periodontal disease, periapical abscesses or antemortem tooth loss present. Flecks or very slight deposits of calculus (colloquially known as tartar) were noted on 13 permanent teeth. Dental disease is commonly the consequence of poor oral hygiene practices and carbohydrate consumption, particularly of simple sugars (such as sucrose) (Hillson 1996, 289). As it is attritional (i.e., becoming more prevalent with advancing age), the dearth of dental disease in the Marcham assemblage probably reflects its youth and as well as a diet low in refined sugar (probably restricted to seasonal fruits and honey).

Dental enamel hypoplasia (DEH) manifests as lines or pits in the enamel due to an interruption or slowing of normal enamel deposition in a developing tooth crown as a result of protracted illness or malnutrition episodes in the first six or seven years of life (*ibid.*, 130). As enamel does not remodel, these defects remain as permanent markers of childhood stress events. DEH manifests as one or two lines on the tooth crowns of 19 teeth in four individuals. However, the faintness of the lines suggests that childhood stress episodes were neither severe nor prolonged.

Extramasticatory wear of the left frontal incisor of male SK21 is suggested by marked inverted U-shaped tooth wear, whilst the right is less marked and angled and straight. The specific activity causing this wear is unclear but probably involved the holding of objects with the front teeth, particularly on the left side (as a 'third hand'), or the passage of an abrasive material in and out the mouth (e.g., processing leather or reeds).

Skeletal pathology

The only fracture noted in the articulated assemblage is a small, depressed cranial fracture (10.6 x 5 mm) with a narrow base in the outer table of the left parietal bone of young adult female SK25. The injury was probably made with a pointed object, like the tip of a blade or a sharpened stick. A halo of healed ectocranial porosity around the lesion suggests that the injury was associated with a fairly extensive scalp infection or bleeding beneath the scalp. Soft tissue trauma is suggested by bony ridging or cortical defects (entheseal changes) suggesting strenuous muscle use and possibly tendon damage in three individuals (Table 1), with some lesions still remodelling at the time of death.

All but the perinate of the articulated group shows skeletal evidence of childhood stress. This took the form of *cribra orbitalia* (porosity in the orbits) of three skeletons (SK19, SK26 and SK21) but was very mild (Stages 1 and 2; Stuart-Macadam 1991), and *cribra femoris* (porosity of the anterior femoral neck) in two individuals (SK19 and SK21). *Cribra*

orbitalis and *femoris* are associated with childhood anaemia (*ibid.*; Roberts and Manchester 2005, 232–3; Waldron 2009, 136–7), which may develop through dietary insufficiency of iron, Vitamin B12 or folic acid, or from blood loss (e.g., through haemorrhage, parasitic infestations or coagulopathies) (Brickley 2018). Macroporosity and fine healed new bone on the ectocranial surface of the greater wing of the sphenoid of the cranium of male SK19 suggests infantile scurvy (Ortner and Ericksen 1997), but no other scorbutic lesions are present.

Largely healed but still porous fine new bone overlies the cruciate eminence of the occipital of the cranium of juvenile SK24. Such endocranial new bone deposition is a non-specific bony response to a range of different disorders including intracranial bleeding, meningitis or encephalitis, or more rarely brain cancer (Lewis 2004).

As with DEH, all of the above indicators of childhood stress lesions are slight, suggesting transient childhood stress events. In contrast, severe or prolonged nutritional stress and/or disease is suggested by marked growth stunting in three individuals. Juvenile SK24 had a dental age of 8.5–9.5 years, yet diaphyseal long bone lengths were consistent with those of a six-year-old, whilst in juvenile SK26, long bone length ageing lagged at least three years behind dental ageing, and in adolescent SK19 by two years. The disparity between the severity of growth stunting and relatively minor stress lesions described above is difficult to explain. The many disarticulated immature elements also show little evidence of dietary deficiencies, such as scurvy, rickets or anaemia.

However, other pathological lesions do suggest ill health in the articulated group. Fine new bone deposition on the visceral surfaces of ribs of burials SK24, SK25 and SK21 indicates chronic respiratory disease (Roberts *et al.* 1998), probably chest infection. It was active at the time of death in all three individuals, but early remodelling indicates that healing had commenced. This new bone was most extensive in adult SK25, involving eight right ribs, covering the entire length of three shafts. There is no new bone on the left ribs, indicating that respiratory disease affected only the right lung.

This young adult female also shows extensive active bilateral periosteal new bone (pnb) deposition on the lower limbs, involving the tibiae, fibulae and several foot bones. The pnb covers the anteromedial and lateral surfaces of both tibial shafts, and patchy bone is also present on the posterior aspect, particularly distally. The distal fibulae are most affected, and also more proximally on the left. Similar bone was deposited on the *sustentaculum tali* of the right calcaneus, and on the shafts of the left third to fifth metatarsals, and right first, and third to fifth. Interpreting the cause of pnb is problematic as it is a non-specific reaction to a range of diseases and to trauma (Weston 2008), but bilaterality of these lesions does suggest a systemic disorder, and as both rib and lower limb lesions were active at the time of death, a common aetiology. Non-specific systemic infection is a possibility but is unlikely. Another possibility is hypertrophic osteoarthropathy (HOA), a systemic condition often triggered by chronic respiratory disease, such as lung cancer, sarcoidosis, cystic fibrosis, trauma, and chronic chest infection (such as tuberculosis) (Buikstra 2019, 503), although the first two being unlikely given her young age, and cystic fibrosis changes more likely to be bilateral.

One skeletal effect of HOA is pnb deposition on multiple elements, particularly of the lower limbs, and may be the case here. Of course, the lower limb and rib pnb in female SK25 may be due to unrelated comorbidities. The tibial pnb may have been a reaction to bilateral localised infection, possibly following soft tissue trauma to both limbs. Alternatively, bilateral tibial and foot pnb may develop following strenuous exercise, such as running or marching on hard uneven ground, particularly if the tibiae develop bony infractions (shin splints). Her non-local origins, the apparent lack of care in laying her out for burial, together with her short stature and the above evidence of long-term disease, together suggest an incomer of lower status (possibly even a slave).

Postmortem modification

There is no evidence of postmortem manipulation of the articulated remains once they were buried, but disarticulated long bone shafts from two Iron Age features do show fine cutmarks on the bone surface (probably filleting marks), and unusual breakage patterns that suggests smashing of the long bone ends using a heavy blunt object, such as a large stone or hammer, when the bone still retained collagen (i.e. was 'green or 'semi-green'), Figure 1. This breakage pattern has close parallels to those on the lower limbs of an Iron Age female pit burial from nearby Childrey Warren, where the distal tibial shafts were smashed to remove the feet (which were then placed next to her shoulders), rather than dismembering them at the ankle joint (Clough 2023). It is possible that these breakages of the Marcham bone also represent dismemberment.



Figure 1: Distal shaft of a disarticulated femur from fill 3048 of Iron Age pit 3047, showing a breakage pattern in keeping with damage inflicted on 'green' or 'semi-green' bone.

Much of the surviving length of a disarticulated adult right ulnar shaft from ring ditch 1048 displays at least 24 parallel, evenly spaced fine cutmarks (3–6 mm in length) along the anterior border or ridge, angled almost at right angles to the long axis of the shaft. These

cutmarks suggest defleshing, possibly to hasten the process of decomposition and dispersal of remains. Both ends of the shaft show ragged breakage patterns suggesting that blunt force was inflicted on bone that still retained collagen (i.e., not on dry bone), Figure 1. A near complete left femoral shaft from pit 14166 shows similar breakage of both ends, and a cluster of at least 12 fine cutmarks on the posterior neck between the lesser trochanter and head (both of which are missing) – possibly an attempt to cut through the joint capsule in order to separate the femur from the pelvis, in order to dismember the lower limb at the hip joint. A second left femur (from gully 3047) shows similar ragged breakage patterns but no convincing cutmarks.



Figure 2: Fine parallel cutmarks (arrows) on the posterior proximal shaft of a disarticulated immature right femur from layer 9183 – possible filleting marks indicating postmortem defleshing.

Cutmarks were also noted on two femoral shafts and an incomplete cranium from Romano-British layers within the arena floor (9183, 9265 and 9270), with one also showing a similar breakage pattern to the above, Figures 2 and 3. There are clusters of fine parallel cutmarks on the largely complete right femoral shaft of a juvenile/adolescent from layer 9183, in an oblique line on the posterior proximal shaft following the proximal insertion of the *Vastus medialis* tendon, as well as at least five tightly spaced parallel oblique cutmarks (4–8 mm in length) on the posteromedial aspect of the distal metaphysis, at the distal insertion of the same muscle – filleting marks suggesting defleshing. Several other isolated possible cutmarks on the posterior shaft, particularly along the *linea aspera*, are less convincing. The surviving distal third of a left tibial shaft from layer 9265 has a near vertical line of at least six fine, parallel, transverse cutmarks on the anterior aspect of the distal metaphysis. One of the 13 fragments of a very incomplete cranial vault of a younger individual (juvenile–young adult) from layer 9270 – at the midline of the frontal bone – shows at least 12 closely spaced, fine, parallel cutmarks (3–5 mm in length) on the

ectocranium, angled inferolateral to superomedially. This tentatively suggests scalping, but no cutmarks were noted on the other vault fragments.



Figure 3: Fine parallel cutmarks (arrows) on the posterior distal shaft of a disarticulated immature right femur from layer 9183 – possible filleting marks indicating postmortem defleshing.

Whilst the arena remains are from Romano-British layers, they may well constitute intrusive Iron Age bone (as suggested by residual Iron Age pottery in these layers) or were deliberate Iron Age inclusions in the later monument. Alternatively, it is possible that this evidence of postmortem defleshing does date to the Romano-British period, when such evidence is rare but not unknown. For example, a frontal bone of an adult female with a central drillhole (presumably for suspension) and multiple fine cutmarks indicative of scalping was found at the Romano-British shrine site at Gill Mill, near Witney (Webb *et al.* 2018), suggesting display of the skull fragment, possibly within the shrine or during religious rituals. Radiocarbon dating of the three elements from Marcham in the future is thus highly desirable.

The cutmarks described above were observed using the naked eye and a jeweller's loupe of very low magnification. A valuable avenue of future research would be to examine them under higher magnification. Using scanning electron microscopy (SEM) would definitively distinguish them from abrasions caused by taphonomic damage and give insights into the nature of the tools used (e.g., flint versus metal blades).

Discussion

The burial of fleshed usually crouched corpses, (presumably interred soon after death) within pits and ditches on settlement sites and hillforts is a well-recognised mortuary practice in the Iron Age of Central Southern Britain and beyond (Whimster 1981), with antecedence in the Late Bronze Age (Brück 2017). Local examples of articulated pit burials include two from Great Western Park, Didcot (Hayden *et al.* 2025), two from Grove Road, Harwell (Thompson

2018), a neonate from Crab Hill, Wantage (Allen *et al.* 2022), two within a banjo enclosure outside Castle Hill hillfort (Allen *et al.* 2010) and four from Childrey Warren, Childrey (Guarino and Barclay 2023). Articulated remains from hillforts in the area are also known from Blewburton Hill, Blewbury (Bendrey *et al.* 2010), Castle Hill, Long Wittenham (Allen *et al.* 2010) and Segsbury Camp, Letcombe Regis (Lock *et al.* 2005), as well as burial within purpose-cut graves in small cemeteries at Yarnton (Hey *et al.* 1999) and Spring Road, Abingdon (Allen and Kamash 2008).

In addition to the above, articulated limbs or other body parts may also be present in these features, presumably disarticulated or dismembered when the corpse was still fleshed or only partly decomposed. A local example of such body part deposition is of an articulated spine, and pelvis and femur of an adult probable female, plus disarticulated elements of the same skeleton, which were placed just above an articulated male burial and animal bone within a large pit in Castle Hill hillfort, Wittenham (Allen *et al.* 2010). Cutmarks on the tibial plateau suggest dismemberment at the knee joint.

Disarticulated human bone is also found dispersed within Iron Age pits and ditches or deliberately placed on their base (particularly crania) and have been found in most of the Oxfordshire sites cited above. Human remains in all three states of decomposition are often associated with animal bone, pottery sherds and sometimes metalwork (as at Marcham), which appear intentional rather than random deposition (Hill 1995; Madgwick 2008).

The process in which the remains of the dead were transformed from the fleshed corpse to disarticulated bone elements, for possible curation as keepsakes by mourners, for display or use in rituals, and ultimately deposited within non-mortuary features, indicates a complex ideological relationship between the living and the dead in Iron Age society, with an emphasis on division of the body and dispersal of body parts and individual elements. The process has been interpreted also as a symbolic transformation or depersonalisation of the individual to join the anonymous or communal world of the ancestors (Madgwick 2008).

Suggestions that disarticulation was achieved by excarnation – by exposing the corpse to the elements to decay – so-called ‘sky burials’ (Carr and Knusel 1997) – is unsupported by macroscopic evidence of bone weathering or by bioerosion studies (Booth and Magwick 2016). In addition, the latter studies do not suggest that above-ground decomposition occurred in more protected environments (e.g., within mortuary houses – possibly four-posters), but rather that some of the dead were buried in the ground, and whilst some were left undisturbed, others were exhumed and once decomposed, their skeletal elements were dispersed (possibly some curated by the living) and sometimes reburied. In other cases, the corpse was left to decay uncovered within pits, and then the skeletal elements were dispersed once decomposition was advanced or complete. The high number of disarticulated small hands and foot bones and several loose teeth within the Marcham features would support either scenario. Lack of canid gnawing on Iron Age bone (including this assemblage) suggests that the pits were covered with a sturdy leather or wooden structure or lid, or similar, to prevent egress by dogs and other carnivores (*ibid*; Magwick 2008).

Such bioerosion studies would be valuable for future researchers to better understand the postmortem treatment of the disarticulated remains from Marcham. In keeping with Magwick's (2008) findings, macroscopic analysis has revealed a lack of weathering and canid gnawing. However, cutmarks and breakage of distal ends of long bones when still 'green' or 'semi-green' provides rare evidence that defleshing and dismemberment were also part of the complex secondary mortuary practices involving dispersal and recycling of the dead.

Conclusion

There is very little evidence of human remains from Iron Age shrines/ritual sites, and as such, those from Marcham have considerable rarity value. The demography of the articulated remains is younger than is generally seen on settlement sites and hillforts in the area, but demographic comparisons are hindered by the small sample size of both groups. Disarticulated bone did show much greater age diversity. The presence of both articulated burials and disarticulated bone is consistent with the treatment of the dead on 'secular' sites, but the evidence of cutmarks and the smashing of long bone ends, probably for defleshing and dismemberment, is a valuable addition to our knowledge of Iron Age secondary mortuary practices, which remains poorly understood.

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