A multidisciplinary study of a burnt and mutilated assemblage of human remains from a deserted Mediaeval village in England

S. Mays a, b,c, R. Fryer b, A.W.G. Pike b, M.J. Cooper d, P. Marshall a

a Research Department, Historic England, United Kingdom
b Archaeology Department, University of Southampton, UK
c School of History, Classics and Archaeology, University of Edinburgh, UK
d Ocean and Earth Science, National Oceanography Centre, University of Southampton, UK

A R T I C L E   I N F O

Article history:
Received 30 November 2016
Received in revised form 13 February 2017
Accepted 20 February 2017
Available online 2 April 2017

Keywords:
Radiocarbon
Strontium isotope
Knife marks
Burning
Wharram Percy
Revenant corpses
Cannibalism

A B S T R A C T

This work is a study of an assemblage of disarticulated human skeletal remains from a pit on the Mediaeval village site of Wharram Percy, England. The remains show evidence of perimortal breakage, burning and tool marks. The purpose of the study is to attempt to shed light on the human activity that might have produced the assemblage. The remains are subject to radiocarbon dating, strontium isotope analysis, and gross and microscopic osteological examination. The assemblage comprises 137 bones representing the substantially incomplete remains of a minimum of ten individuals, ranging in age from 2–4 yrs to >50 yrs at death. Both sexes are represented. Seventeen bones show a total of 76 perimortal sharp-force marks (mainly knife-marks); these marks are confined to the upper body parts. A minimum of 17 bones show evidence for low-temperature burning, and 6 long-bones show perimortal breakage. The radiocarbon dates centre on ca. 11th–13th century CE, and the remains represent the residua of more than one event. Strontium isotopic analyses of dental enamel are consistent with a local origin. Possible behaviours that may have produced the assemblage include starvation cannibalism and apotropic efforts to lay revenant corpses.

© 2017 The Authors. Published by Elsevier Ltd. This is an open access article under the CC BY license (http://creativecommons.org/licenses/by/4.0/).

1. Introduction

This paper is a study of an assemblage of disarticulated human skeletal remains from a Mediaeval settlement site in England. The remains show evidence of perimortal tool marks, burning and breakage. The work uses osteological study, isotopic analysis and radiocarbon dating in an attempt to shed light upon the human behaviour that might have produced the assemblage.

2. Material

The study material comes from Wharram Percy, a deserted Mediaeval village in North Yorkshire, England (Fig. 1). Wharram Percy was a small, low-status rural agrarian settlement, and in the Mediaeval period it consisted of two facing rows of dwellings orientated approximately north–south. The shorter eastern row lay in a valley, together with the church and its churchyard. The longer western row lay on a 10–15 m high plateau, separated from the eastern buildings by a steep escarpment (Beresford and Hurst, 1990). Archaeological excavations have taken place both in the church/churchyard and in areas of domestic occupation (Marlow-Mann and Wrathmell, 2012).

The human remains that are the focus of the current work come not from the churchyard, but from a domestic context toward the southern end of the western row of buildings, situated on the plateau. They were recovered in 1963–4 from a location now known as Site 12 (Fig. 1), but formerly known as Area 6 (Milne, 1979). The prime purpose of excavation in this area was to investigate an earthwork that appeared to represent the remains of a large long-house. The human remains that are the subject of the current study come from features comprising three intercutting, approximately square pits. This pit-complex consists of a central pit about 2.1 m wide, flanked to the east and west by two smaller ones each about 1 m wide. The depth of the westernmost pit was 0.3 m, the depth of the other two is not recorded. The central pit appears to be cut by the westernmost one but its relationship with the other is unclear. The pit complex lay immediately to the south-west of the long house (which was 15th century in date), but predated its construction. During excavation, all remains were hand-recovered; there was no sieving to retrieve small bones. The pit-complex was not excavated stratigraphically, but rather numbers were assigned to find trays as they entered post-excavation processing. The human remains were disarticulated when found and bear seven different finds numbers. These numbers show a relationship to the vertical or horizontal location within the pit-complex. However, upon examination of the skeletal remains, it became clear that conjoins existed between fragments bearing all seven finds codes. Therefore, for analytical purposes, the human...
remains are treated as a single group. The site report (Milne, 1979) noted that the pits contained a mixture of Roman and early Mediaeval pottery, and it is therefore likely that the fills represent reworked deposits. The existence of conjoins between human remains from different locations in the pit-complex supports this. The nature of the site records means that it is now unclear what finds (other than pottery), if any, came from these features, and it is not possible to confirm that the human remains in the site archive comprise all of those that were recovered. The publication on the site (Milne, 1979) contains no osteological report and mentions no anthropogenic modification to the skeletal remains. The interpretation offered was that the remains were Romano-British burials inadvertently disturbed and reburied by villagers in late Mediaeval times (Milne, 1979: 46). This explanation subsequently proved untenable when radiocarbon determinations of five (unspecified) human bones produced dates in the Mediaeval period (Clark, 1987).

3. Methods

3.1. Osteology

For subadult (aged ca. < 18 yrs) remains, age at death was estimated using dental development and epiphyseal fusion, using methods identical to those for the Wharram Percy churchyard burials (Mays, 2007: 84–5). A general impression of age was also gained from bone size by comparison with growth curves constructed for the churchyard burials which have been aged using dental development (Mays, 2007: Table 26). In adult remains, age was estimated from dental wear, and sex from cranial and pelvic morphology using identical methods to those applied to the churchyard remains (Mays, 2007: 85). For the more complete adult mandibles, measurements were taken (Mays, 2007: 131n), and discriminant functions were generated using mandibles from churchyard burials whose sex could be determined from pelvic indicators. Both these, and morphological features (Brothwell, 1981: 61), were used to determine sex, which was only assigned to a mandible when the two methods were in agreement.

Upon initial examination, it was clear that some of the bones showed sharp force marks, signs of burning and perimortem breakage. These features were identified and recorded systematically.

Tool marks, and breaks to bones occurring in antiquity were distinguished from recent damage by their weathered edges. Two types of perimortem sharp force trauma were distinguished: knife-marks and chop-marks. Knife-marks are made by drawing a knife blade across bone and are identified as elongated grooves of V- or U-shaped cross-section; they may show parallel, longitudinal striations within the main groove (Walker & Long, 1977; Reichs, 1998; Greenfield, 1999). Chop-marks result from striking bone with a sword or other sharp bladed implement. They may completely slice through bone, tend to be linear, their edges are generally well-defined and clean, and the surfaces of the cut edges are usually fairly flat and smooth (Wenham, 1989; Lewis,
2008; Kimmerle & Baraybar, 2008: 276). Examination of bones was undertaken under strong, raking light, aimed at highlighting surface features. A hand lens and a binocular microscope were used to aid identification of features. Morphology of marks was elucidated using scanning electron microscopy as appropriate.

Mechanical properties of fresh bone are characterised by significant elasticity and plasticity by virtue of its organic content. Due to degradation of the organic component (mainly collagen), the typical fracture pattern of dry bone differs from that of fresh bone (Outram, 2002). For long bone diaphyses, fresh bone tends to break with a curvilinear fracture, dry bone tends to show straight or stepped breaks. In fresh bone, the broken surface of a fracture is usually smooth with sharp edges, but in dry bone it has a roughened appearance. The above criteria are not absolute (Outram, 2002), but they act as a guide to distinguish breaks that occurred when the bone was fresh, as would be expected of peri-mortem anthropogenic breakage. Carnivore gnawing and other animal damage was identified using established criteria (Haynes, 1980, 1982, 1983; Binford, 1981: 44–77), as were human tooth marks (Cáceres et al., 2007; Fernández-Jalvo & Andrews, 2011).

Heating of bone causes colour changes which vary (inter alia) with temperature, and these alterations were used to identify exposure of remains to heat. Upon heating, bones darken in colour to dark brown and then black, corresponding to charring of the organic component. As the temperature rises further, the colour lightens until it becomes predominantly light grey or white; this lightening appears to correspond to the progressive loss of the organic component by combustion (Mays, 2010: 322).

3.2. Radiometric dating

Because of the mixed nature of the deposits in the pit-complex, it was decided to radiometrically date some of the specimens bearing sharp force marks and evidence for peri-mortem breakage, and to combine the results with those of the five (unidentified) human bones from the pit-complex dated in the 1980s. The aims are to: investigate whether the remains from the pit-complex are contemporary with the burials in the churchyard; to estimate the date range encompassed by the remains; and to investigate whether the anthropogenically modified remains have dates consistent with one another and hence potentially represent the result of a single event, or else were a result of repeated behaviours over a period of time. Ten bones (five showing knife-marks, five showing peri-mortem breakage) were selected for dating on the basis that they had sufficient cortical bone to provide a date without unduly damaging the specimen.

The five samples of human bone dated at AERE Harwell between 1982 and 86 were all pretreated using the standard acid–base-protocol and converted to carbon dioxide (Otlet & Slade, 1974). One sample, HAR-4949, was dated by liquid scintillation spectrometry. Following pretreatment the carbon dioxide was synthesised to benzene using a method similar to that initially described by Tammers (1965) using a vanadium-based catalyst (Otlet, 1977) and dated as described by Otlet (1979) and Otlet and Warchal (1978). The remaining four samples, HAR-4948 and HAR-4950–52, were dated in a miniature gas proportional counter. Procedures for gas purification, counter filling, and gas proportional counting, using the miniature counter, followed Otlet and Evans (1983) and Otlet et al. (1983).

The ten samples of human bone submitted for dating in 2014 were sent to the Oxford Radiocarbon Accelerator Unit (ORAU; 5 samples) and Scottish Universities Environmental Research Centre (SUERC; 5 samples) to provide a degree of cross-checking and ensure the reproducibility and accuracy of the radiocarbon measurements (Bayliss and Marshall, forthcoming). The samples of human bone dated at ORAU were processed using the gelatination and ultrafiltration protocols described by Bronk Ramsey et al. (2004a). The samples were then combusted, graphitised and dated by accelerator mass spectrometry (AMS) as described by Bronk Ramsey et al. (2004b) and Dee and Bronk Ramsey (2000). One sample, from a mandible, failed due to a low collagen yield.

The human bones submitted to the SUERC were pretreated using a modified Longin method (Longin, 1971). CO2 was obtained from the samples by combustion in pre-cleaned sealed quartz tubes as described by Vandeputte et al. (1996), with the purified CO2 converted to graphite (Slota et al., 1987) and dated by AMS (Xu et al. 2004; Freeman et al., 2010).

3.3. Strontium isotope analyses

One potential reason for deviant mortuary treatment is that individuals come from outside the community that buried them (Binford, 1971). Analysis of strontium isotope ratios in dental enamel was carried out to investigate this possibility. Isotopic composition of dental enamel varies with the location in which an individual lived whilst that enamel was forming during childhood (Bentley, 2006). Results from material from the pit-complex (N = 7 individuals) were compared with Medieval burials (N = 9) from the churchyard at Wharram Percy, to test the hypothesis that those individuals buried in the pit came from outside the normal catchment area (the parish) for burial in the churchyard. Samples were removed from M3 or M2 where M3 was not available. The surface of the enamel in the sampling area was first cleaned by abrasion with a dental burr. A longitudinal section of enamel was then removed as a wedge using a diamond cutting disk. The sample was typically 1 mm thick, representing the complete available growth axis of the enamel (i.e. from crown to cervix). The Sr isotope analyses of each sample represent the weighted (by Sr concentration and enamel thickness) average isotopic values over the periods of enamel formation which are approximately 2.5–8 years for M2 and 8.5–14 years for M3 (AIOqhtani et al., 2010). Adhering dentine, which is far more susceptible to diagenetic alteration, was removed using a dental burr. The sample was then cleaned in an ultrasonic bath, with multiple changes of MilliQ 18 MΩ water and dried in a vacuum oven at 60 °C. The prepared samples were then dissolved in 3 N HNO3 prior to running through ~50 μl Sr-Spec columns to isolate the Sr. The Sr fraction was dried down and loaded onto an outgassed Re filament with 1 μl of a Ta activator solution. The samples were analysed on a ThermoScientific Triton Thermal Ionisation Mass Spectrometer using a static procedure with amplifier rotation and a 88Sr beam of 2 V. Fractionation was corrected using an exponential correction normalised to 86Sr/88Sr = 0.1194. NIST987 was run as a standard and the long term average for NIST987 on this instrument is 0.710249 ± 0.000022 (2sd) on 70 analyses.

4. Results

4.1. Inventorial and demographic data

The remains are rather fragmented, but are grossly in good condition with little post-depositional erosion of surfaces. They represent a minimum of 100 adult and 37 subadult bones, together with 409.6 g of unidentified fragments. There were also 24.9 g of non-human bone

<table>
<thead>
<tr>
<th>Skeletal elements with discolouration indicative of exposure to heat</th>
<th>Number</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crania</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Mandibles</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>Vertebræ</td>
<td>2</td>
<td>15</td>
</tr>
<tr>
<td>Scapulae</td>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td>Sterna</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Humeri</td>
<td>2</td>
<td>9</td>
</tr>
<tr>
<td>Ribi</td>
<td>3</td>
<td>23</td>
</tr>
<tr>
<td>Tibiae</td>
<td>1</td>
<td>6</td>
</tr>
</tbody>
</table>
fragments. A full inventory is given in Supplementary Table 1, as is a list of the alterations due to disease identified in the remains (see also Supplementary Fig. 1).

For the adults, the minimum number of individuals (MNI) is given by jaw bones. There were six mandibles and a right maxilla with zygomatic that did not come from the same individual as any mandible, giving an MNI of 7. There were a minimum of four adult crania, three represented only by a partial calvaria, and one by a partial calvaria and some of the basi-occipital. The incomplete nature of the crania meant that no mandible or maxilla could be associated with any calvaria. Skulls and long-bones (of which there were 31) are well represented in the assemblage, but bones of the vertebral column and extremities are few. As regards sex, there were pelvic bones from two females; one cranium and two mandibles were probably male; one cranium was probably female. For the mandibles, three were over about 50 years of age, one was about 40–50 years, and two were about 30–40 years. The morphology of the maxilla and articulated zygomatic (Brothwell, 1981; White, 1991) was suggestive of female sex, and the individual was aged about 17–25. One cranium was adult-sized but showed an unfused spheno-occipital synchondrosis, suggesting an age in the mid-late teens (Coqueugniot and Weaver, 2007).

More than half the subadult elements comprised most of the right hand bones of a single individual, aged about 15–17 years. There were also paired radii from a child of about 13–14 years, a pair of pelvic bones from an individual about 10–17 years, and a mandible aged about 14–15 years. There were cranial elements from two young children (approximate ages 3–4 years and 2–4 years). The minimum number of subadult individuals was three.

Representation of skeletal elements in the assemblage as a whole, given as a percentage of that expected of complete individuals, given an MNI of 10, is shown in Fig. 2. Figures for the articulated burials from Wharram Percy churchyard, expressed as a percentage of those expected if each of the MNI of 10 were a complete skeleton, in material from the pit-complex (Fig. 2) suggests that all elements, other than the cranium and mandible, are more poorly represented in the pit-complex assemblage. Among the post-cranial elements, patterns of representation appear broadly similar in pit and churchyard remains; an exception is bones from the vertebral column, which are less well represented relative to other postcranial elements in the pit-complex material.

The palaeopathological findings comprised degenerative joint conditions, porotic hyperostosis and a case of Paget’s disease of bone (Supplementary data). With the exception of this last, these conditions are commonplace in the churchyard population (Mays, 2007). The palaeopathological findings therefore offer no evidence that the pit-complex individuals were consistently singled out for non-normative burial treatment because of any unusual skeletal diseases.

In sum, the whole collection consists of 137 bones representing a minimum of 10 individuals: six full adults (two females, two probable males, two unsexed), one possible female who died in her late teens/early 20s (above enumerated with the adults), one subadult in their mid teens, one child aged about 2–4 and one aged about 3–4 years.

4.2. Thermal alteration

A total of 17 bones showed evidence for burning (Table 1), 5 crania and 12 post-cranial elements. Crania more frequently showed burning than did other elements (chi-square (with Yates’ continuity correction) = 24.4, p < 0.001). Most of the burnt post-cranial bones were from the upper body. Of the cranial fragments that could not be assigned to any individual cranium, 41% by weight showed evidence for burning on their anterior aspects. In the calvariae, burning was most

![Fig. 2. Representation of skeletal elements, calculated as a percentage of those expected if each of the MNI of 10 were a complete skeleton, in material from the pit-complex (heavy line). For comparison, representation of elements in burials from the churchyard at Wharram Percy, calculated as a percentage of that expected if all burials (N = 687) were complete, is also shown (dashed line).](image-url)
pronounced toward the vertex of the skull, with lower parts less affected. For example, among three adult calvariae preserving occipital bones, burning was either confined to superior parts of the squama (two cases) or was more pronounced there than on more inferior parts (one case). A fourth cranium, represented solely by a right parietal bone, showed burning that increased in intensity toward the cranial vertex (Fig. 3).

All discolouration was confined to the ectocranial surfaces, except at open sutures where it spread a few millimetres onto the endocranial surface. Areas of blackening were generally surrounded by areas discoloured dark brown. All crania are fragmentary, but adjoining fragments showed similar degrees of firing. All heat-affected crania showed exfoliation of the external table to varying extents, and many fragments of exfoliated outer table could be refit.

In a group of four cervical vertebrae (C1–C4) belonging to a single individual, the inferior tip of the neural spine of C3 and part of the inferior surface of the body and neural arch of C4 are affected by heat (Fig. 4); C1 and C2 are not. The pattern suggests that these vertebrae may have been articulated when burnt, with the inferior parts of C4 most exposed to heat. Most of the post-cranial elements showing exposure to heat showed evidence of discoloration on part of one side only – for example a partial tibia showed blackening on the anterior surface only, and a partial humerus showed brown/black discoloration on its posterior surface. Post-depositional breaks across burnt areas revealed that discoloration generally penetrates little into the interior of the bone. Exceptions occurred among more comminuted fragments where some endosteal surfaces were browned/blackened. All burnt bones are adult, save the maxilla referred to above, and a frontal bone, probably from the same individual (3–4 yrs old), which was discoloured near the glabella.

4.3. Tool marks

One partial humerus shows two broad chop-marks adjacent to a weathered break. A frontal bone from an adult cranium shows a 15 × 20 mm subcircular hole. It is bevelled internally, and ectocranially it is surrounded by eight small indentations. The edges of these marks are weathered. Given the reworked nature of the deposits in the pit-complex, it is possible that these alterations represent damage from later digging activities. In addition to the above, there are 76 perimortem sharp force tool marks located on 17 bones (Table 2, Figs 5-9).

The cut-marks are concentrated in the upper body, with none below the chest area. Most are fine knife-marks. The only exceptions are three chop-marks on the occipital bone of cranium A (Fig. 8): three intersecting blade-cuts with straight, well-defined edges have severed the basi-occipital from the rest of the left side of the occipital bone (the basal and condylar parts of which are missing). The lack of fragmentation at the margins of the cuts emphasises the sharpness of the instrument used. The lower part of the occipital squama also shows three deep approximately antero-posteriorly orientated cuts that penetrate the full thickness of the outer table. Three elements (a third and a fourth cervical vertebra (part of the group of four articulating vertebrae described above), and cranium A (which does not articulate with these cervical vertebrae)) show both cut-marks and evidence for burning.

All cut-marked bones are adult, with the exception of cranium A, which probably came from an individual in their mid-late teens. Under scanning electron microscopy (Fig. 10), the knife-marks have narrow, symmetrical V or U-shaped profiles with flattened bases, sometimes with faint longitudinal scratch marks. These features are typical of marks from unserrated metal blades (Greenfield, 1999).

4.4. Perimortem breakage

The diaphyses of the following elements show smooth, sharp-edged curvilinear breaks with smooth broken surfaces indicative of fracture to fresh bone (Fig. 11): left tibia (distal 20% of bone present), two right femora (distal 20% of each bone present), femur (midshaft fragment), left humerus (distal 50% present, bone also shows 6 knife-marks), right humerus (proximal 10% present), left humerus (midshaft fragments), right humerus (midshaft fragment). The prevalence of long-bones showing evidence of breakage when fresh is a minimum of 6/36 (17%). The midshaft fragments listed above show breakage at both ends and are also split longitudinally (Fig. 12). There were instances of incipient fracture cracks (i.e. cracks running from fracture lines), and spalling of cortical surfaces at margins of breaks, each characteristic of breaks occurring to fresh bone (White, 1992: 137–8, 141–3; Knüsel & Outram, 2006). There was one possible impact pit (Fig. 13) indicative of striking of fresh bone. All fractured bones are adult. No clear signs of animal gnawing or human tooth marks were seen on any element.

4.5. Radiometric dating and dietary stable isotope ratios

The results (Table 3) are conventional radiocarbon ages (Stuiver and Polach, 1977), and are quoted in accordance with the Trondheim convention (Stuiver and Kra, 1986). The calibrations of these results, which relate the radiocarbon measurements directly to the calendrical time scale, are given in Table 3 and in Fig. 14. All have been calculated using the datasets published by Reimer et al. (2013) and the computer program OxCal v4.2 (Bronk Ramsey 1995, 1998, 2001, 2009).
calibrated date ranges cited are quoted in the form recommended by Mook (1986), with the end points rounded outward to 10 years or five years for those with errors <25 years. The ranges in Table 2 have been calculated according to the maximum intercept method (Stuiver and Reimer, 1986); the probability distributions shown in Fig. 14 and Supplementary Fig. 2 are derived from the probability method (Stuiver and Reimer, 1993).

Carbon and nitrogen stable isotope analysis indicate that the individuals consumed a diet predominantly based upon temperate terrestrial C₃ foods (Schoeninger and DeNiro, 1984; Katzenberg and Krouse, 1989). The radiocarbon results are therefore unlikely to be affected by any significant reservoir effects (Bayliss et al., 2004). All the samples gave C:N values within the range normally used to indicate good collagen preservation (2.9–3.6; DeNiro, 1985).

The nine radiocarbon measurements from samples dated in 2014 are not statistically consistent (T’ = 58.1; T’(5%) = 15.5; v = 9; Ward and Wilson, 1978) and therefore represent material of different ages. Even the cut-marked mandibles and clavicles represent individuals who died at different times as their radiocarbon determinations are statistically inconsistent (T’ = 14.7; T’(5%) = 7.8; v = 3).

The dated human remains from the pit represent individuals that died over a significant period of time. Bayesian statistical modelling (Buck et al., 1992; Bayliss et al., 2007a), was undertaken using OxCal v.4.2 (Bronk Ramsey, 1995; 1998; 2001; 2009) to aid estimation of the date range of the remains. The date ranges from the model are given in italics to distinguish them from simple, calibrated radiocarbon date range of the remains. The date ranges from the model are given v.4.2 (Bronk Ramsey, 1995; 1998; 2001; 2009) to aid estimation of the

### 4.6. Strontium isotope ratios

An estimation of the ‘local range’ is required when using Sr isotopes to distinguish locals from non-locals. There are a number of methods to constrain the local range which include estimating Sr values from the local geology, and the measurement of reference samples (sediments, plants, animals (e.g. Bentley et al. 2004)).

Wharram Percy sits on a small area of Cretaceous chalk geology in the Yorkshire Wolds. Geological and biosphere Sr maps (Evans et al. 2010; Neale, 1974; Wood and Smith, 1978), and studies for Sr in the region (Montgomery et al., 2007; Evans et al., 2012), divide Yorkshire into two 87Sr/86Sr zones; north and northwest being 0.7084–0.7100, and south and southeast being 0.7073–0.7084. This range is further constrained by Montgomery et al. (2007) and McArthur et al. (2001) using soil leachates of the chalk rich soils, representative of those around Wharram Percy, which yield Sr isotopic values between 0.7075 and 0.7078. Additional bioavailable Sr is provided by rainwater (with 87Sr/86Sr of 0.7092) so Montgomery et al. (2007) suggest for an entirely chalk-based subsistence, with a rainwater input would yield a local 87Sr/86Sr range of 0.7075–0.7092. This range is consistent with the results obtained from the individuals buried in the churchyard which are mostly likely to represent individuals local to the parish (Table 4, Fig. 15).

With one exception (Mandible D, unsexed adult aged >50 yrs) the Sr isotopic values of individuals buried in the pit are statistically indistinguishable from those buried in the graveyard (t-test, P = 0.19). Both fall within the local Sr range, and it is likely that both groups are ‘local’ to Wharram Percy (i.e. they are consistent with the chalk geology on which Wharram lies). Mandible D produced more radiogenic Sr values. Whilst these are unlikely to represent the chalk geology of the Wolds, strontium isotopic ratios between 0.7092 and 0.7100 have been found for Triassic and Permian mudstones (Montgomery et al., 2007) which are found <30 km to the west of Wharram Percy. So this ‘immigrant’ need not have moved a long distance. However, Sr values between 0.7080 and 0.7100 are characteristic of large areas of the UK (Evans et al. 2010), so the individual may have come from further afield. Without further studies (e.g. with oxygen isotopes) it is impossible to

### Table 2
Cut-marked bones.

<table>
<thead>
<tr>
<th>Bone Location of cuts</th>
<th>Number of cuts</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cranium A Inferior part of occipital squama</td>
<td>8</td>
<td>Unfused spheno-occipital synchondrosis</td>
</tr>
<tr>
<td>Basi-occipital</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Right occipital condyle</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Mandible 1 Left ramus, lateral surface</td>
<td>3</td>
<td>50+ yrs at death</td>
</tr>
<tr>
<td>Right ramus, anterior margin</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Mandible 2 Right gonium</td>
<td>2</td>
<td>c40–50 yrs at death, probably male</td>
</tr>
<tr>
<td>Mandible 3 Left ramus, posterior margin</td>
<td>4</td>
<td>c30–40 yrs at death, left hemi-mandible only present</td>
</tr>
<tr>
<td>Second cervical vertebra Anterior surface of body</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Third cervical vertebra Anterior surface of body</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Fourth cervical vertebra Anterior surface of body</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Left transverse process</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Mid – lower thoracic vertebrae (T79) Left side of body</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Left clavicle Inferior surface</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Anterior and posterior surfaces adjacent to sternum end</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Right clavicle Posterior surface</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Left humerus Posterior surface</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Humeral shaft fragment</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Right rib Outer surface</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Right rib Outer surface</td>
<td>4</td>
<td>(?2nd rib)</td>
</tr>
<tr>
<td>Right rib Inferior surface, adjacent to articular surface for vertebral transverse process</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Left rib Outer surface</td>
<td>7</td>
<td>7rd rib, Evenly spaced approx. parallel cuts</td>
</tr>
<tr>
<td>Left rib Superior/outter surface</td>
<td>10th rib</td>
<td></td>
</tr>
</tbody>
</table>

### Table 3
Bone Location of cuts Number of cuts Remarks

- Mandible D, unsexed adult aged >50 yrs
- Unfused spheno-occipital synchondrosis
- These clavicles are from different individuals
- Probably not the same humerus as above
- (?2nd rib)
- 7rd rib, Evenly spaced approx. parallel cuts
- 10th rib
say more than this individual is unlikely to have spent his/her childhood in the region immediately local to Wharram Percy.

The presence of only locals in the graveyard, albeit on a small number of samples, indicates little or no mobility in the population. Perhaps this is to be expected from a low status, rural, agricultural population, but it does contrast to studies at the Anglian (5th–7th century CE) site of West Heslerton in North Yorkshire, 12 km to the NE of Wharram Percy. Here, nearly half of the individual strontium isotope ratios lay

**Fig. 5.** Composite diagram showing distribution of cut marks in the remains. The cervical vertebrae shown in inset come from a single individual, and the cut marks on the occipital bone shown in inset also occur in one individual (not the same one as the vertebrae).
outside the local range (Montgomery et al., 2005; Budd et al., 2004), though it is not clear over what distances immigration occurred because of the complex local geology (West Heslerton lies just off the Cretaceous chalk).

5. Discussion

The skeletal material from the pit-complex consists of the substantially incomplete remains of at least ten individuals. Among the remains, compared to other elements, skulls are over-represented and vertebrae under-represented. The ages at death of the individuals whose remains make up the assemblage range from about 2–4 years to over 50 years. Both sexes appear to be represented. The brown/black discoloration of burnt bones suggest low temperature (<400 °C) burning, the dark colours indicating that burning occurred when the bone retained its organic content. The observations that, for the crania, adjoining fragments showed similar thermal discoloration and, save at open sutures, alterations were confined to the ectocranium, are consistent with burning whilst they were intact. Delamination of the outer table was a prominent feature. Delamination has been demonstrated in experimental burning of cadaver heads (Pope & Smith, 2004), as well as in forensic cases of corpses suffering burning (Alunni et al., 2014), and has been stated to seldom occur in burning of dry crania (Curtin, 2008). The pattern observed in the present crania, by which thermal alteration is confined to, or is more pronounced toward, the cranial vertex is also consistent with burning in the fleshed state: flesh acts as an insulator, so that areas of thicker soft tissue, such as the lower parts of the occipital bone, are less thermally altered than the upper parts of the cranial vault.
where soft tissue is thinner. This pattern of burning has been observed in experimentally burnt cadaver heads (Pope & Smith, 2004), and in forensic cases where corpses were subjected to burning (Owsley et al., 1995; Symes et al., 2008).

Turning to the post-cranial remains, the pattern whereby the group of articulating cervical vertebrae C1 – C4 show thermal discolouration only on the inferior parts of C4 and, less severely, on the inferior tip of the neural spine of C3, may suggest they were articulated with one another but separated from the remainder of the vertebral column when burnt. The vertebrae showed knife marks. The suggestion is that mutilation preceeded burning – i.e. the head was severed and then burnt. On long-bones, thermal alteration was mainly confined to the subperiosteal surfaces. The lack of penetration of heat to the medullary cavities suggests fire of short duration. This suggestion is also consistent with the pattern of burning seen on the crania, in which thermal alteration was almost entirely confined to ectocranial surfaces and was less in parts that would have had thicker covering of soft tissue. The observation that many limb bones showed thermal discolouration to one surface only suggests they may have lain on the ground or other surface so that only one side was exposed to heat.

Sharp force tool marks were confined to the upper body parts and were particularly concentrated in the head/neck area. Some cut-marked bones also showed burning or perimortem breakage. Most sharp-force marks appear to have been made with a fine knife drawn across the
bone. The only evidence for chop-marks was in the base of cranium A; given their location in the basal part of the occipital, it is likely that these injuries were inflicted upon a severed head. Indeed, the knife-marks at the occipital condyle and squama of this cranium may be associated with separation of the head from the vertebral column. The knife-marks at the occipital condyle and squama of this cranium may be associated with separation of the head from the vertebral column. The knife-marks at the occipital condyle and squama of this cranium may be associated with separation of the head from the vertebral column.

Table 3
Radiocarbon and carbon and nitrogen stable isotope results.

<table>
<thead>
<tr>
<th>Laboratory code</th>
<th>Sample reference</th>
<th>Material</th>
<th>$\delta^{13}$C (%)</th>
<th>$\delta^{15}$N (%)</th>
<th>C:N</th>
<th>Radiocarbon age (BP)</th>
<th>Calibrated date (95% confidence)</th>
</tr>
</thead>
<tbody>
<tr>
<td>OxA-30234</td>
<td>Clavicle 1*</td>
<td>Human bone, clavicle</td>
<td>−19.8</td>
<td>8.9</td>
<td>3.2</td>
<td>869 ± 23</td>
<td>cal 1050–1220 CE</td>
</tr>
<tr>
<td>OxA-30235</td>
<td>Clavicle 2*</td>
<td>Human bone, clavicle</td>
<td>−19.6</td>
<td>10.2</td>
<td>3.2</td>
<td>895 ± 23</td>
<td>cal 1040–1215 CE</td>
</tr>
<tr>
<td>P36541</td>
<td>Mandible 1*</td>
<td>Human bone, mandible</td>
<td>−19.9</td>
<td>10.1</td>
<td>3.2</td>
<td>916 ± 23</td>
<td>cal 1030–1185 CE</td>
</tr>
<tr>
<td>OxA-30236</td>
<td>Mandible 2*</td>
<td>Human bone, mandible</td>
<td>−20.2</td>
<td>10.8</td>
<td>3.2</td>
<td>1003 ± 28</td>
<td>cal 980–1120 CE</td>
</tr>
<tr>
<td>SUERC-53434</td>
<td>Mandible 3*</td>
<td>Human bone, mandible</td>
<td>−20.1</td>
<td>10.7</td>
<td>3.2</td>
<td>969 ± 28</td>
<td>cal 1010–1160 CE</td>
</tr>
<tr>
<td>SUERC-53435</td>
<td>Humerus fragment 1*</td>
<td>Human bone, humerus</td>
<td>−20.1</td>
<td>8.4</td>
<td>3.3</td>
<td>973 ± 30</td>
<td>cal 1010–1160 CE</td>
</tr>
<tr>
<td>SUERC-53436</td>
<td>Humerus fragment 2*</td>
<td>Human bone, humerus</td>
<td>−20.1</td>
<td>8.9</td>
<td>3.2</td>
<td>1109 ± 28</td>
<td>cal 880–1000 CE</td>
</tr>
<tr>
<td>SUERC-53437</td>
<td>Humerus fragment 3*</td>
<td>Human bone, humerus</td>
<td>−19.9</td>
<td>9.8</td>
<td>3.3</td>
<td>946 ± 28</td>
<td>cal 1020–1170 CE</td>
</tr>
<tr>
<td>OxA-30284</td>
<td>Femur fragment 1*</td>
<td>Human bone, femur</td>
<td>−20.3</td>
<td>8.8</td>
<td>3.2</td>
<td>970 ± 28</td>
<td>cal 1010–1160 CE</td>
</tr>
<tr>
<td>SUERC-53438</td>
<td>Right femur fragment 1*</td>
<td>Human bone, right femur</td>
<td>−20.1</td>
<td>8.9</td>
<td>3.2</td>
<td>1003 ± 28</td>
<td>cal 1200–1450 CE</td>
</tr>
<tr>
<td>HAR-4948</td>
<td>103093/1</td>
<td>Human bone</td>
<td>−20.8</td>
<td>6.5</td>
<td>100</td>
<td>1060 ± 100</td>
<td>cal 710–1190 CE</td>
</tr>
<tr>
<td>HAR-4949</td>
<td>103093/2</td>
<td>Human bone</td>
<td>−22.3</td>
<td>6.5</td>
<td>100</td>
<td>1190 ± 100</td>
<td>cal 710–1190 CE</td>
</tr>
<tr>
<td>HAR-4950</td>
<td>103093/3</td>
<td>Human bone</td>
<td>−23.1</td>
<td>6.4</td>
<td>100</td>
<td>1220–1440 CE</td>
<td></td>
</tr>
<tr>
<td>HAR-4951</td>
<td>103093/4</td>
<td>Human bone</td>
<td>−22.2</td>
<td>6.4</td>
<td>100</td>
<td>1270–1250 CE</td>
<td></td>
</tr>
<tr>
<td>HAR-4952</td>
<td>103093/5</td>
<td>Human bone</td>
<td>−24.1</td>
<td>6.4</td>
<td>100</td>
<td>1270–1250 CE</td>
<td></td>
</tr>
</tbody>
</table>

* Cut-marked.
* Perimortem breakage.
* Harwell $\delta^{13}$C were used to correct for fractionation when calculating the radiocarbon ages and are not comparable to those more recently obtained Oxford and Glasgow measurements on IRMS, and are not suitable for dietary reconstruction.

Radiometric dating indicates that the study material comes from the late Mediaeval period, with dates centering around the 11th–13th centuries CE. The Wharram Percy, churchyard was used for burial throughout the later Mediaeval period, beginning in about the mid tenth century CE (Bayliss et al., 2007b), so the pit-complex material is contemporaneous with the use of the churchyard. The remains represent people whose deaths span more than a century. The evidence for burning, cut marks and breakage in the perimortem period indicates oblique knife marks have been found in forensic cases where decapitation using a knife was part of post-mortem dismemberment of the corpse (Reichs, 1998). The clavicular cuts may be associated with dismemberment (Kanetake et al., 2008), as may the cuts on the upper ribs (Pietrusewsky et al., 2007).

Unlike the tool marks and the thermal alterations, which predominately affected the upper parts of the body, perimortal breakage of long-bones involved upper and lower limbs to a similar extent. However, it is only the larger long-bones (humerus, femur, tibia) that are affected.

Fig. 14. Probability distributions of the radiocarbon dates from remains from the Wharram Percy pit-complex. Each distribution represents the relative probability that an event occurs at a particular time. For each radiocarbon date, two distributions have been plotted: one in outline which is the result of simple radiocarbon calibration, and a solid one based on the chronological model used. The other distributions correspond to aspects of the model. The large square brackets down the left-hand side of the diagram and the OxCal keywords define the overall model exactly.
that they are the product of more than one event rather than of a single episode of activity carried out on material of different ages. The lack of animal gnawing suggests that the bones were not exposed on the surface, but were curated or perhaps more likely, given the residual pottery found in the pit-complex, buried elsewhere before being deposited in the pit.

The churchyard at Wharram Percy acted as the usual burial place for those who died in the parish, the limits of which lie within the chalklands of the Yorkshire Wolds (Bell, 1987; Wrathmell, 2012). The strontium isotopic data from the dental enamel of the churchyard burials are consistent with individuals who lived in the immediate locale during childhood. In general, the strontium isotopic data from the remains from the pit-complex resemble those from the control burials from the churchyard.

6. Interpretation

The strontium isotopic data provide no support for the suggestion that the individuals buried in the pit were non-locals and hence no support for the hypothesis that those whose remains were found in the pit-complex were accorded deviant mortuary treatment because they were of non-local origin. Alternative explanations need to be sought.

In the late Mediaeval period, some groups, including suicides and felons, were theoretically excluded from churchyard burial. However, save for interments at battlefield or massacre sites (Fiorato et al., 2000; Loe et al., 2014; Wallis, 2014), executed felons in burial grounds associated with the place of execution (Buckberry & Hadley, 2007), or occasional finds of infant burials in settlements (Rahtz, 1969; Chapman, 2010), archaeological evidence for burials or other deposits of human remains outside formal cemeteries is rare (Daniell, 1997: 104; Gilchrist & Sloane, 2005: 73). At Wharram Percy, a total of three articulated inhumations (an infant and two adults) were recorded from domestic contexts. They come from various locations in the northern part of the site, some 220–340 m distant from the pit-complex. None has been shown to be contemporaneous with the churchyard burials (one is 7th century CE, two are undated (Richards, 1992: 84; Wrathmell, 1989: 15; Rahtz et al., 2004: 11–15)). A literature search failed to reveal assemblages of human remains from late Mediaeval England that bore close parallels with that from the Wharram Percy pit-complex.

Victims of battle (Novak, 2000) or smaller scale acts of violence (Stroud, 1993) in the Mediaeval period generally show sharp force trauma, and in an example where the building where the slaughter took place was set ablaze, there was also some charring of remains (Falys, 2014). However, in such cases, sharp force trauma is normally in the form of chop-marks from swords or axes; the paucity of chop-marks, and the evidence for postmortem processing in the form of knife-marks and breakage of long-bones in the current material is inconsistent with these explanations. Occasionally, Mediaeval funerary practice involved postmortem removal of the heart or other organs for separate burial, and this might potentially leave knife- or chop-marks on the bones. However, this treatment was restricted to high-status individuals, and in such instances physical remains were deposited in consecrated ground (Gilchrist & Sloane, 2005: 80). The remains from the pit-complex predate the mid-16th century statute making witchcraft a capital offence (and a sentence that was sometimes carried out by burning) (Stoyle, 2011), and they are earlier than the widespread burning of heretics in that same century (Cavill, 2013). They are also too early in date to represent residua of disposal of medical dissections (Richardson, 1988: 30–51). In any event, none of the above scenarios could account for the full gamut of modifications seen in the current remains.

Accounting for the totality of features of the human remains from the pit-complex is difficult, but the nature of the evidence, together with historical documentary sources for the period suggest two possible scenarios: starvation cannibalism and attempts to lay the revenant dead.

6.1. Cannibalism

In the Mediaeval period, poor harvests were a cause of famine and consequent elevated mortality (Dyer, 1998). Between 1066 CE and 1300 in England, chroniclers recorded at least 12 famines worthy of note (Kershaw, 1973). The soils at Wharram Percy are thin and prone to nutrient exhaustion (Hayfield, 1988: 25). Its harsher climate consequent upon its upland location in northern England would have made Wharram Percy more vulnerable to weather-related crop failure than more southerly or lowland settlements. It is therefore likely that the community would have experienced repeated famine episodes during the Middle Ages. Western European Mediaeval texts provide occasional reference to cannibalism prompted by starvation, but reports are generally presented in a stereotyped manner, with parallels to the Biblical siege of Samaria or to the siege of Jerusalem in Flavus’ War of the Jews, a work widely known in the Middle Ages. Mediaeval chroniclers’ references to cannibalism may therefore be a kind of shorthand to convey the severity of a famine using cultural reference points that would have been familiar to their readers; they cannot be taken as factual accounts of actual events (Jordan, 1996: 148–50; Marvin, 1998; Vandenberg, 2010). Although reliable Mediaeval accounts of it are elusive, starvation cannibalism is clearly possible, given both the frequency

Table 4

<table>
<thead>
<tr>
<th>Sample ID</th>
<th>(^{87}Sr/^{86}Sr ± 2\ SE)</th>
<th>Tooth sampled</th>
</tr>
</thead>
<tbody>
<tr>
<td>NA004</td>
<td>0.708339 ± 0.000014</td>
<td>M3</td>
</tr>
<tr>
<td>NA006</td>
<td>0.708207 ± 0.000013</td>
<td>M3</td>
</tr>
<tr>
<td>EE003</td>
<td>0.708353 ± 0.000014</td>
<td>M3</td>
</tr>
<tr>
<td>NA178</td>
<td>0.708289 ± 0.000017</td>
<td>M2</td>
</tr>
<tr>
<td>NA033</td>
<td>0.708635 ± 0.000015</td>
<td>M3</td>
</tr>
<tr>
<td>NA121</td>
<td>0.708401 ± 0.000016</td>
<td>M3</td>
</tr>
<tr>
<td>NA088</td>
<td>0.708207 ± 0.000013</td>
<td>M3</td>
</tr>
<tr>
<td>WCO144</td>
<td>0.708167 ± 0.000016</td>
<td>M3</td>
</tr>
<tr>
<td>EE018</td>
<td>0.708929 ± 0.000014</td>
<td>M3</td>
</tr>
<tr>
<td>Pit</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mandible A</td>
<td>0.708296 ± 0.000012</td>
<td>M3</td>
</tr>
<tr>
<td>Mandible B</td>
<td>0.709655 ± 0.000014</td>
<td>M2</td>
</tr>
<tr>
<td>Mandible 3</td>
<td>0.708617 ± 0.000015</td>
<td>M3</td>
</tr>
<tr>
<td>Maxilla A</td>
<td>0.708481 ± 0.000013</td>
<td>M2</td>
</tr>
<tr>
<td>Mandible B</td>
<td>0.708444 ± 0.000012</td>
<td>M2</td>
</tr>
<tr>
<td>Mandible 1</td>
<td>0.708322 ± 0.000014</td>
<td>M2</td>
</tr>
<tr>
<td>Mandible2</td>
<td>0.709059 ± 0.000013</td>
<td>M3</td>
</tr>
</tbody>
</table>

Fig. 15. Strontium isotope results from molar teeth from the Wharram Percy graveyard and pit remains. Error bars are smaller than data markers. The local range is estimated from published soil leachates and rainwater Sr isotope values (Montgomery et al., 2007).
of famine in the Middle Ages, and the abundant evidence from different cultures from around the world that cannibalism may be resorted to in such situations (Petrinovic, 2000).

The signature of cannibalism in skeletal remains is highly variable, but potentially some or all of the following alterations may be present: tool marks from bladed implements used to dismember the body or remove flesh; burning or pot-polish from cooking by roasting or boiling respectively; fracturing of long-bones to extract marrow; under-representation of vertebrae and other trabecular bone-rich elements due to them having been crushed to yield fats; and resemblance of bodily treatment with that accorded to faunal remains of comparable sized mammals used as food within the same culture (White, 1992; Kantner, 1999; Turner & Turner, 1999; Hurlbut, 2000; Knüsel & Outram, 2006).

In the adult, fatty yellow marrow is present within the medullary cavities of long-bones (Outram, 2002). The intentional breakage of long-bones in the human remains from the Wharram Percy pit-complex is consistent with opening of the medullary cavities to liberate marrow. In starvation, bone marrow is one of the last fat sources to be mobilised, so even in individuals dying of hunger, fat reserves would likely be present in the bones (Outram, 2002). The pattern seen at Wharram Percy, with breaking open of the marrow cavity and production of longitudinally split shaft fragments is characteristic of faunal remains where marrow is used as a fat resource (Outram, 1999, 2002), and has been observed in human remains in presumptive archaeological cases of cannibalism from the US Southwest (Turner, 1993; Turner & Turner, 1995; Billman et al., 2000). In these latter cases, there is also a paucity of vertebral elements, which has been interpreted in terms of crushing of these elements for bone grease (Turner, 1993); the paucity of vertebrae in the Wharram Percy pit-complex might be viewed in a similar light.

The Wharram Percy remains do not show pot-polish, but the alterations due to burning might be consistent with controlled use of fire in roasting. Remains from presumptive cannibalism sites in the US Southwest resemble the current remains in showing brown/black thermal alteration and, in skulls, exfoliation of the ectocranial table (Turner, 1993; Novak & Kollmann, 2000; Lambert, 2014).

Turning to the cut-mark evidence, the distribution of cuts varies widely between different cases of cannibalism, depending upon the ways in which corpses were utilised. Perhaps the most relevant comparisons are with documented instances of starvation cannibalism where corpses were processed with sharp-edged metal tools. At Colonial Jamestown, USA, there are contemporary accounts of starvation cannibalism relating during the winter of 1609–10 (Herrmann, 2011). Disarticulated human remains recovered recently from the site include a cranial and mandible with knife- and chop-marks. There are severe chop-marks to the rear of the cranium; if one accepts that cannibalism occurred at this settlement (and the veracity of contemporary accounts is disputed (Herrmann, 2011)), then their purpose may have been to extract the brain so that it could be consumed (Stromberg, 2013). During the ill-fated 1845 Sir John Franklin Arctic expedition, corpses appear to have been dismembered, cooked and eaten, with processing of remains for marrow extraction (Woodman, 1991; Brandt, 2011: 364–388; Mays and Beattie, 2016). In skeletal remains from that expedition, knife-marks were present on approximately 23% of elements (Mays & Beattie, 2016), confined to the post-cranial skeleton, and particularly concentrated around the joints and (puzzlingly) the hands and feet (Keenleyside et al., 1997). At Wharram Percy, knife-marks are fewer (occurring on 12% of bones). In addition they do not cluster around major joints in the appendicular skeleton. Groups of cut-marks running oblique or transverse to the long axis of shafts of ribs and long-bones have been interpreted in archaeological human remains as filleting marks (e.g. Bello et al., 2016). The groups of transverse knife-marks observed on a humerus and some ribs in the current material might be viewed in this light. However, in a case of starvation cannibalism in 1874 in Colorado, where meat was apparently cut from intact corpses with no disarticulation or bone breakage for marrow, knife marks were concentrated at muscular attachments and involved all areas of the body, save the head and neck (Rautman & Fenton, 2005). In the light of the above cases, the concentration of knife-marks in the head/neck region in the Wharram Percy material is difficult to explain within a cannibalism scenario, as is the lack of cuts below the chest area.

Approximately 1–2% of faunal remains from the settlement at Wharram Percy contemporary with the pit-complex human bones show burning (Pinter-Bellows, 2000; Richardson, 2004, 2005). For sheep and pig remains, 1–3% show knife marks and 1–6% show chop marks (Richardson, 2004, 2005). Breaking of bones for marrow extraction was not normally practised (Richardson, pers. comm., 2015). The human remains from the pit-complex thus more often show breakage, burning and knife-marks than do the faunal remains. In the faunal remains, most cut-marks were associated with reduction of the carcass for food (Richardson, 2005), but the even balance between chop- and knife-marks contrasts with what was observed for the human remains from the pit-complex, indicating a difference in approach.

6.2. Revenant corpses

A revenant is a re-animated corpse that arises from its grave. Belief in revenants was widespread in Mediaeval northern and western Europe. Revenants were usually malevolent, spreading disease and physically assaulting the living (Gordon, 2014). Textual accounts of revenants in England are known from the 11th century onward (Blair, 2009), but they may represent more ancient folklore (Simpson, 2003). Clerics were able to accommodate beliefs in revenants within Christian theology, considering that it was Satan who animated these corpses; but the predominant view seemed to associate revenants with the individual whose corpse it was: reanimation arose as a result of a lingering life-force in individuals who committed malign, evil deeds and projected strong ill-will in life, or who experienced a sudden death leaving energy still unexpended (Caciola, 1996). Methods of dealing with the undead involved physical and/or spiritual means, with an emphasis on the former (Simpson, 2003). The most usual way was to dig up the body and subject it to mutilation (particularly decapitation) and burning (Oldridge, 2007: 67). For example, in the late 12th century, William of Newburgh, a Yorkshire monk, relates that, in Berwick, a revenant corpse roamed at night, and these visitations only ceased when local youths dug up the offending body, dismembered it and burnt the pieces in a fire (Stevenson, 1861: V: 23). In Mediaeval texts, the revenant is a fleshed corpse rather than a skeleton, it is only in the liminal period between death and the decay of the flesh that the body poses a threat (Caciola, 1996). Mutilation and burning represent efforts to destroy the integrity of the corpse. In the Wharram Percy remains, the burning was insufficient to affect very greatly the integrity of the skeletal remains but it would doubtless have removed, or rendered unrecognisable the fleshy parts. As discussed above, the knife marks can be interpreted in terms of dismemberment or other mutilation of the body, and those in the head/neck area may be associated with decapitation. The breakage observed in some of the long-bones might appear superficial if it was the fleshed corpse that was feared, but there are instances of revenants being tackled by breaking the legs of the corpse (Martin, 1979). In some cases (e.g. Stevenson, 1861 V:247; Bartlett, 2002: 197), Mediaeval sources report that the heart was cut from the revenant corpse as part of actions to stop it from wandering. Ablation of the heart may leave sharp-force marks on thoracic skeletal elements. However these tend to be located on the sternum, ventral parts of thoracic vertebrae and toward the sternal extremities of the ribs (Mafart et al., 2004; Tiesler & Cucina, 2006; Klaus et al., 2010), areas that do not show tool marks in the current assemblage. Written sources usually fail to specify the final fate of the remains after the troublesome corpse has been mutilated/burnt, but disposal of remains in a
domestic context within a settlement could be argued as inconsistent with the idea that the corpses were feared. Revenants reported by Mediaeval chroniclers are invariably adults and mainly men (Mays, 2016). This may in part reflect that men were more likely to have had the kinds of lives, or died the kinds of deaths, associated with restless corpses (Caciola, 1996), and the violent physicality of the Mediaeval revenant may be more readily associated with males. The fact that women and children are well-represented in the Wharram Percy pit-complex remains may argue against the revenant explanation. However, surviving textual accounts of revenants are selections, often made by clerical writers for use as exempla, from tales that were circulating at the time (Mays, 2016). Therefore, the extent to which the textual sources reflect the full gamut of folk beliefs is unclear.

7. Conclusions

There are considerable difficulties in interpretation of the human remains from the pit-complex at Wharram Percy. The depositional history of the remains is unknown. The presence of pottery of different dates from the pit-complex at Wharram Percy. The depositional history of the remains is unknown. The presence of pottery of different dates to account for the remains, cannibalism and attempts to combat the spread of disease at Wharram Percy, which may count against a cannibalism scenario.

Despite these difficulties, two principle scenarios may be advanced to account for the remains, cannibalism and attempts to combat the threat of revenant corpses. The case for cannibalism is supported by the fracturing of long-bones, which would be consistent with marrow extraction, although, alternatively, this could represent part of a spectrum of actions intended to combat a revenant corpse. The treatment of remains differs from that accorded to medium sized animals used as food at Wharram Percy, which may count against a cannibalism scenario. The burning observed could be consistent with either destruction of the flesh in the case of treatment of revenants, or roasting in cases of cannibalism. The patterning in knife-marks appears more consistent with decapitation and dismemberment, as documented as means of dealing with cases of reanimated corpses, but the balance age and sex ratio conflicts with textual accounts of revenants. The evidence does not permit arguments to be advanced decisively in favour of either scenario, but it may be more consistent with attempts to lay revenant corpses than with starvation cannibalism.

Acknowledgements

Thanks are due to John Vallender, Historic England, for help in preparing Fig. 5, to Poly Baker and Fay Worley, Historic England, for discussion of sharp-force marks, and to Stuart Wrathmell and Ann Clark (Wharram Research Project) for finds and context information from the Wharram Percy excavations. We are grateful to reviewers whose insightful comments that have improved this paper.

Appendix A. Supplementary data

Supplementary data to this article can be found online at http://dx.doi.org/10.1016/j.jasrep.2017.02.023.

References
