The darker angels of our nature: A butchered Early Bronze Age human bone assemblage from Charterhouse Warren, Somerset, UK

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Abstract

An Early Bronze Age assemblage of human remains from Charterhouse Warren, southwest England, exhibits evidence of extreme violence. At least 37 men, women and children were killed and butchered and their disarticulated remains were thrown down a 15m deep natural shaft in what is most plausibly interpreted as a single event. This level and scale of violence to the living as well as to the dead is unprecedented in British prehistory.

Introduction

Steven Pinker's 2011 book 'The Better Angels of Our Nature' reflects on the decline in violence over the course of human history (though not uncontroversially, e.g. Ferguson 2013). The site of Charterhouse Warren, Somerset, reveals the darker side. Excavated in the 1970s, and dating to the Early Bronze Age, the remains of at least 37 men, women and children thrown down a 15m deep natural shaft. This little-known assemblage is striking for the sheer number of cutmarks indicating dismemberment and defleshing, alongside perimortem fracturing of long bones and injuries to crania resulting from intentional blows. While evidence for violence is not unknown in British prehistory, nothing on this scale has been found, and the site joins a small number of Continental Neolithic, Chalcolithic and Bronze Age sites showing extreme violence and postmortem processing of human remains. This paper presents an overview of research undertaken thus far on this internationally important site, focusing on the evidence for skeletal trauma and body processing, radiocarbon dating, and the origins of the individuals using isotopic analyses.

There is limited direct physical evidence for violent conflict in the British Chalcolithic (ca. 2500–2200 cal BC) and Early Bronze Age (ca. 2200–1500 cal BC). This is despite many hundreds of well-preserved, complete and often articulated skeletons. The best-known exception is that of the young adult male skeleton from the ditch at Stonehenge, shot multiple times with flint-tipped arrows (Evans 1984). At Racton, West Sussex, an adult male exhibits sharp-force trauma consistent with a metal-edged weapon, probably a bronze dagger, an example of which accompanied the burial (Needham et al. 2017). Such cases are difficult to interpret. Was this violence occurring within the community, as homicide, revenge or socially sanctioned punishment for some transgression? The latter might certainly be suggested for the Stonehenge individual, for example. Or was violence occurring between communities or polities, thereby meeting a standard anthropological definition of warfare (Otterbein 2004)?

While evidence for disarticulated EBA skeletal remains is known (Bloxam and Parker Pearson 2022; Brück 2006), there are many more complete, articulated skeletons, particularly for the Beaker period of southern England. Mendip, however, appears to be an exception in this regard: while over 300 round barrows are known, those that have been investigated held only cremated remains, though this may be because they are rather later in date, falling after ca. 1900 BC, when cremation began to dominate funerary rites (Lewis and Mullin 2012). And while it is not unknown, there is also limited evidence for multiple burial in the British EBA (e.g. Fitzpatrick 2011). The large assemblage of disarticulated remains at Charterhouse Warren, then, immediately stands in contrast to normative funerary rites for the period. Adding to this the evidence for trauma and extensive postmortem processing of the body, there is clearly something highly unusual about the site.

Charterhouse Warren Farm Shaft

Two series of excavations were undertaken at Charterhouse Warren Farm 'Swallet'[1] (CWFS), Somerset, southwest England, initially in 1972–76 and again in 1983–86 (Figures 1, S1–S5). For an account of both, see Levitan et al. (1988) from which the following brief summary is taken. The emphasis is on the earlier campaign, as this produced the human bone assemblage that is the focus of this paper. CWFS is a 20m-deep natural shaft in the Carboniferous limestone plateau of the Mendip Hills. Excavations were originally aimed towards finding the entrance into a cave system suspected to exist because of the way water drained from the large, saucer-shaped surface depression following heavy rains. There were no previous indications that this was an archaeological site.

Excavations in the Entrance Shaft were designated Horizons 1-4. Horizon 1 comprises the upper 9m of the shored shaft starting at 6m below the surface, and contained comparatively few faunal and human remains, concerning which little information is available (as is also the case for the side passage designated Horizon b; SI1). Horizon 2, first reached in July 1975, was distinguished by its high density of disarticulated, fragmented human and faunal remains, overwhelmingly *Bos* (SI2; Table S1). It is the human material from this layer that forms the focus of the present study. Sherds of a nearly complete Bell Beaker were also found at this level (Figure 1). Beneath this, Horizon 3 contained relatively little material, with the exception of some cattle remains and

[1] While originally termed a 'swallet', a dissolution hollow, the deep shaft is actually formed by a natural fault in the limestone. Thus, while we retain the abbreviation CWFS, the 'S' refers to 'shaft' rather than swallet.

coarse black potsherds. Horizon 4 extended for 0.74m to a depth of 20.79m, containing neonatal remains, animal bones and a small assemblage of artefacts including a flint dagger, an antler spatula and a collection of 'sponge finger stones' (Figure 1), all typical of a Beaker funerary assemblage (Woodward and Hunter 2015). Single radiocarbon dates obtained on human bone from Horizons 2 and 4 are statistically indistinguishable at 2343–2036 cal BC (χ^2, df=1, T=0.1(5%, 3.8)) (Table S3), despite the intervening 4.45m of nearly sterile fill of Horizon 3 (Levitan and Smart 1989).

The human bone assemblage

Analysis of the disarticulated, highly fragmented human bone assemblage from Horizon 2 at Chaterhouse Warren is challenging. The material from the Entrance Shaft was recovered under very difficult conditions, in a cramped space at 15m depth in sediments consisting of sticky, silty clay interspersed with many stones. Stratigraphic details are available for some elements, but in other cases it is not clear whether elements are from Horizon b or from Horizon 2. This attribution is crucial, since the former appears to span the LBA to the Romano-British period, while Horizons 2 and 4 date to the EBA. Approximately one-third of the elements show some degree of dark staining, affecting from small patches to most or all of the element. This has been determined to be a mineral staining (SI3, Figure S6).

The surviving human bone assemblage numbers over 3000 individual bones and bone fragments at least tentatively identified to element, the vast majority of which derive from Horizon 2 (the human remains from Horizon 4 are restricted to a small number of elements from one or possibly two neonates). Most of the ca. 2000 additional smaller fragments unidentified to element are probably also human. Constructing a demographic profile is made challenging by the fragmentary and incomplete state of the material. The shaft was sectioned so that only approximately half the remains were recovered. Nevertheless, it is possible to broadly characterise the assemblage. Based on a combination of non-repeating fragments of mandibles and long bones (cf. Knüsel and Outram 2004), at least 37 individuals are represented, though this is likely a conservative estimate, and the real total may be higher. Age-at-death ranges from neonate to older adult (Figure S7). Aside from noting that both sexes are represented, the nature of the material precludes an estimate of the relative proportion of females and males at this stage (this information will become available through ongoing aDNA analyses). There is an unusually high proportion of older children and adolescents, together comprising nearly 50% of the assemblage. This is more in keeping with what would be expected with a catastrophic mortality profile (SI4; Figure S7), since these age groups usually experience low mortality (Weiss 1975). That infants and younger children appear underrepresented may reflect taphonomic and/or recovery biases. Ongoing aDNA analysis of familial relationships will provide additional insights into the nature of the assemblage, and whether it could represent a snapshot of a 'living community'.

Several cranial elements display clear evidence of blunt force trauma (Figure 2). The main criteria are curvilinear fracture lines with smooth edges and oblique fracture margins resulting in a patinated internal bevel (Kranioti 2015). The number of individuals affected is difficult to determine, given the highly fragmented condition of the assemblage. But of 20 cranial elements that include at least part of the right orbit (and so represent distinct individuals), nine (45.0%) show evidence of perimortem fracturing. Considering all cranial elements, 30.4% (170/559) show perimortem fracturing (SI5; Table S2). This implies that many, if not all, of the individuals in Horizon 2 at CWFS were killed violently prior to their dismemberment and butchery.
The most striking feature of the CWFS assemblage from Horizon 2 is the frequency of cutmarks and intentional fracturing. While the site was previously noted to contain a '…large number of [human] bones, many of which bear cut-marks and other evidence of 'butchery'' (Levitan et al. 1988, 174), its full extent has not been appreciated. Cutmarks, often multiple, are found on 20% of the human elements, and one-third exhibit perimortem fracturing. While the full faunal assemblage has yet to be studied, it can be noted that only about 6% of a subset of ca. 160 non-human mammal bones exhibit cutmarks. The majority of the cutmarks appear to have been made with stone rather than metal tools (Figure 3; SI5), though further examination is required before the latter can be excluded.

The locations of the cutmarks on the post-cranial skeletal remains are consistent with both disarticulation and defleshing (Galán and Domínguez-Rodrigo 2013). Of the cranial elements, 25.2% (141/559) exhibit cutmarks, with frontal bones and mandibles being the most frequently affected (Table S2). One of the more complete crania presents a number of long cutmarks extending longitudinally along the length of the frontal bone, indicating removal of the scalp (Figure 2g-h). A number of mandibles show multiple deep cutmarks on the anterior surface of the ascending ramus, in a position that indicates slicing through the powerful masseter muscle, facilitating the removal of the lower jaw (Figure 4). In at least one case, there are long slicing cutmarks on the interior surface of the body of the mandible, suggesting removal of the tongue.

Five of 12 largely complete (hence belonging to different individuals) atlas vertebrae exhibit cutmarks, as do six of 10 axis vertebrae (Figure 5). They range from shallow slices to short, deep cuts; in all cases they occur on the anterior surfaces, and would have served to remove the head from the torso. Cutmarks also occur on a number of scapulae and on the posterior surfaces of several distal humeri, relating to the separation first of the upper limb as a whole, and then of the forearm (Figure 6). Similarly, cutmarks on the ilium and the proximal femur mark the removal of the lower limb from the torso. The detachment of the foot from the leg is indicated by cutmarks on calcanei and tali. Defleshing marks are seen along the shafts of long bones away from their articular ends, as well as on both the external and visceral surfaces of ribs indicating evisceration.

Approximately one-third of the Horizon 2 assemblage exhibits fractures characteristic of those on fresh bone, with many long bone fragments exhibiting curving margins and smooth, patinated surfaces (Figure 7; Table S2); some display percussion pits and conchoidal fractures. An unusual damage pattern is seen on several distal femora, in which both the lateral and medial condyles have been removed. Some distal humeri show similar damage. That this was the result of intentional action is clear firstly because this kind of symmetrical breakage would be highly unusual for post-depositional taphonomic damage, and secondly because of the presence of a series of distinctive C- and D-shaped percussion pits on the condyles, adjacent to the removals (Figure 8). These were caused by indirect percussion, perhaps employing a bone awl or chisel. This intensive postmortem processing is consistent with marrow removal, yellow marrow in the case of the long bone diaphyses, and red marrow in the case of the femoral condyles.

Several ribs exhibit bending fractures that may have been caused by the forceful opening of the chest cavity from a cut made along the midline (cf. Novak and Kollmann 2000). Cutmarks on the visceral surfaces of ribs demonstrate that the cavity was exposed. In addition, a number of small bones of the hands and feet exhibit fresh bone crushing fractures, consistent with the flat molars of omnivores, including humans, rather than the sharper punctures caused by carnivores (Figure 9) (Fernández-Jalvo and Andrews 2011; Saladié et al. 2013). There is little evidence for either carnivore or rodent gnawing in the assemblage, consistent with the rapid infilling of the shaft inferred by the excavators (Levitan et al. 1988).

One event?

Nine new radiocarbon dates were obtained on human bone from Horizons 2 and 4, for a total of 11, including the two previously published results (Levitan and Smart 1989) (SI6; Table S3). A further two dates were obtained on individuals from the uppermost deposits of Horizon b. All samples from Horizons 2 and 4 gave dates in the EBA, while those from Horizon b returned LBA/EIA and MIA dates, confirming that the upper levels post-date the EBA.

Given the intervening 4.45m of largely sterile Horizon 3, Horizons 2 and 4 can be treated as sequential. A Bayesian model (Bronk Ramsey 2009) therefore treats the EBA remains as belonging to two consecutive phases (Figure 10). Given that it includes only two dates (possibly belonging to the same individual), Horizon 4 is poorly constrained, with start and end dates modelled as *2425–2140 BC* and *2280–2100 BC* (95.4%) respectively (modelled dates are presented in italics, rounded to nearest 5 years). Of more central concern to this paper is Horizon 2, modelled as starting *2210–2055 BC*, ending *2190–2010 BC* (95.4%) (Table S4). The modelled duration over which the deposition of human remains occurred in Horizon 2 is *0–125 yr* (95.4%) or *0–60 yr* (68.3%), with the highest single probability being that of a single event (Figure S8), although deposition over some decades and up to a century or so is possible.

Another approach is to test whether all of the human results from Horizon 2 can be combined statistically, and so are consistent with a single event. This is indeed the case, combining to 2197–2038 cal BC (3721±10 BP, χ^2: df=8, T=14.2(5% 15.5)). However, the dates from Horizons 2 and 4 cannot be successfully combined (χ^2: df=10, T=21.7(5% 18.3)). This leaves open the possibility that two events are represented, separated by up to a century. Chronological precision is constrained by late third millennium wiggles in the calibration curve, resulting in multiple intercepts.

Locals or outsiders?

The stable carbon and nitrogen isotope results are consistent with a terrestrial diet that is isotopically relatively homogeneous across Neolithic and Bronze Age Britain. Strontium isotopes ($^{87}Sr/^{86}Sr$) are often more successful at identifying non-locals. The method informs on whence foods were obtained, rather than on the specific foodstuff. For example, wheat grown on the Cretaceous Chalk downlands of southern England would impart a different $^{87}Sr/^{86}Sr$ value to humans than the same wheat grown on the Carboniferous limestone of Mendip. The $^{87}Sr/^{86}Sr$ and $\delta^{18}O$ results for 25 humans from Horizon 2 are largely consistent with a ‘local’ origin, with the exception of two outliers with higher $^{87}Sr/^{86}Sr$ values, which could reflect origins to the west or south (SI8; Figures S9–S10; Tables S6–S8).

A Bronze Age massacre?

The human bone assemblage from Horizon 2 at Charterhouse Warren is clearly exceptional, both in terms of the number of violent deaths – evidence for which is otherwise rare in the British EBA – and in terms of the extensive and systematic body processing, previously unknown for this period. Some 37 men, women and children – and possibly many more – were killed at close quarters with blunt instruments and then systematically dismembered, defleshed and their long bones fractured in a way that can only be described as butchery, though also suggesting a ritualised, sacrificial element. They were deposited in what was probably a single event some time between 2210 and 2010 cal BC, in a partly infilled natural shaft that was still 15m deep, together with a faunal assemblage that also shows evidence of butchery, though this may be less intensive than seen on the human remains. Whether there is any connection between what appears to have been a more formal burial deposit in Horizon 4 and the jumbled remains of Horizon 2 is unclear, although this seems possible. The shaft then infilled more slowly, so that elements of an aurochs were deposited some five centuries later in what was still a sizeable depression of ca. 11m depth. The later deposits of Horizon b are of a completely different character, and are probably unrelated to what lay beneath. The location itself may be the common denominator, with the natural shaft and large underlying cave system inviting comparisons with a portal to the underworld.

The presence of perimortem injuries argues against an unusual postmortem treatment of the deceased as part of a mortuary rite. The cranial injuries are all consistent with unhealed blunt force trauma. Yet the bow and arrow was certainly used in conflict in the EBA: the male from the ditch at Stonehenge, shot multiple times with arrows, dates to 2338–1899 cal BC (BM-1582: 3715±70 BP) (Evans 1984), broadly contemporary with CWFS. This, together with the absence of any projectile points recovered from the shaft, suggests that the violence was face-to-face from the outset, and not the result of an armed confrontation between two groups. It further implies that the victims were either already captives or were taken by surprise. The latter is a common tactic in warfare among small-scale societies and includes the pre-dawn raid as well as subterfuge (Gat 1999; Keeley 1996). Assuming that a single event is represented, the presence of at least 37 individuals suggests the massacre – no other term applies – of a substantial segment of a community. A massacre can be defined as the indiscriminate killing of multiple individuals (in this case, men, women and children), often with excessive violence, which in the case of CWFS may have been mainly expressed postmortem. Such occurrences do not happen in isolation, nor are they 'meaningless violence'; rather, they are intensely political (Sémelin 2009). The level of violence involved suggests this was either retaliation for a previous event, or that a serious social taboo was felt to have been breached. The recent finding by Swali et al. (2023) that two female children from CWFS had the plague (*Yersinia pestis*) is intriguing, as the implication is that more individuals may have been infected, but whether and how this is related to the massacre is unclear, particularly given what seems to have followed the killings.

It is difficult to understand the human remains from Horizon 2 in anything other than a context of extreme violence and systematic corporeal insult seemingly including anthropophagy. While there are occasional examples of cutmarks on British and Irish Neolithic human remains, these are usually explained in a context of hastening the transition to a fully skeletonised state that constitutes a new 'ancestral' status (Baxter 2001; Geber et al. 2017). There is no history of ritual dismemberment of the deceased for the British EBA, nor would this explain the prevalence of cranial blunt force indicating that these individuals were killed beforehand. An unusual mortuary treatment within the community, perhaps for those dying unusual deaths for example, would also be difficult to reconcile with the dating evidence, which suggests, if not a single event, then certainly deposition of a large number of individuals over no more than a few decades. This does raise a question concerning the scale of the event, given the number of humans and animals represented. If all were actually consumed in a dark communal feast, then this implies a very large gathering and the complicity of potentially hundreds of people. Whether some element of selection was involved, and its basis if so, is unknown. It is possible that the act of butchery was more important than the actual consumption, which may have been token. This aspect requires further research, including integrating the faunal assemblage.

While distant in time, the closest comparanda spatially is with the Late Upper Palaeolithic site of Gough's Cave (ca. 14,700 cal BP), located ca. 3 km to the west (Figure 1), where the remains of a minimum of six individuals exhibited evidence for dismemberment and butchery, interpreted as anthropophagy (Bello et al. 2015; Andrews and Fernández-Jalvo 2003). Many of the modifications are strikingly similar to those at CWFS, including probable human chew marks on foot and hand bones and ribs. But while the crania exhibit cutmarks indicating defleshing and modification by multiple circumferential blows into 'skull cups' (Bello et al. 2011; though see Fernández-Jalvo and Andrews 2021), there is no clear evidence for violent trauma being responsible for the deaths of these individuals. In this sense, and in scale, Gough's Cave differs markedly from CWFS.

Other cases of anthropophagy have been proposed (and debated) for a number of prehistoric European sites (SI9). Though often controversial, the evidence that cannibalism did occur on occasion seems incontrovertible (Saladié and Rodríguez-Hidalgo 2017). The reasons behind it, however, are both more interesting and less clear. Culinary cannibalism is extremely rare worldwide and is improbable given the sporadic nature of the European evidence. Starvation cannibalism *in extremis* seems highly unlikely for CWFS given the commingled fauna, dominated by *Bos*, and the size and demography of the human bone assemblage (but see Mays et al. (2017) for a possible medieval case). A cultural pattern of EBA mortuary rites involving ritual dismemberment of the deceased has already been dismissed, as we would expect evidence for this to be more widespread, and while the circulation of ancestral 'relics' has been proposed for Bronze Age Britain, this involves little if any evidence of active dismemberment (Booth and Brück 2020). Nor does it take into account the manner of death. This leaves an understanding of cannibalism as occurring within a context of violent conflict, in which humans are dehumanised and treated as animals, consistent with the deliberate deposition of human and faunal remains together in the shaft. This is not to say that this was not a highly ritualised event – indeed this may have been essential for isolating such behaviour from quotidian experience. CWFS may be best interpreted as an extreme form of 'violence as performance', in which the aim was to not only eradicate another group, but to thoroughly 'other' them in the process. While the remains themselves seem to have been removed from view soon afterwards (to judge from the paucity of carnivore scavenging), an event of this scale could not be hidden, and no doubt resonated across the wider region and over time. In this sense this was a political event. It is also highly unlikely that it was an isolated incident with no precursors, and highly likely that it led to retaliations by surviving relations and allies. That no specific evidence has been found for either is hardly surprising given the nature of the archaeological record. The purely accidental discovery of CWFS is salutary in this respect. Had the remains been left on the ground in the aftermath, or only shallowly buried, their chances of survival for millennia would have been negligible.

This raises the question of why this time and this place, to which there may be no answer. Neither climate change, ethnic conflict, nor competition over material resources seem to offer convincing explanations. Climate change has often been implicated in the escalation of conflict (e.g. Barnett and Adger 2007; Carleton et al. 2009; Gronenborn 2006; McCool et al. 2022) and indeed CWFS does fall within the 4.2 ka climate event, but there are two major problems with linking them. Firstly, while the 4.2 ka event is a widely accepted climatic downturn leading to widespread and prolonged cooling and drying across the mid-latitudes of the northern hemisphere (Bond et al. 1997; Mayewski et al. 2004), evidence for its impact in Britain and Ireland specifically has proven elusive (Roland et al. 2014), and, if anything, seems to have involved increased wetness rather than drying (Jordan et al. 2017). Secondly, its recent framing as extending from ca. 4500 to 3900 cal BP (ca. 2550-1950 cal BC) (Kleijne et al. 2020; Yan and Liu 2019) makes it is difficult to see how temporal co-occurrence could ever be convincingly argued in relation to a single event. Any proposed causal relationship would need to encompass much broader changes in the archaeological record, such as the abandonment of a region or major shifts in subsistence practices and/or demography, or increased evidence for widespread conflict, but as noted above such evidence is limited for the British Chalcolithic and EBA.

The history of the twentieth century shows only too well that inter-ethnic violence can be episodic, explosive and extreme. Yet, while there is recent compelling genetic evidence for large-scale population replacement in Britain beginning in the Chalcolithic, ca. 2500 cal BC (Armit and Reich 2021; Olalde et al 2018), this pre-dates CWFS by some three centuries. The current indications are that the influx of immigrants with steppe ancestry from the Continent was considerable from the outset, with no genetic evidence for the co-existence of communities with markedly different ancestries that might have given rise to conflict under certain conditions (cf. Schröder and Schmidt 2001). Furthermore, the isotopic evidence is consistent with the victims being local to the region rather than outsiders, though further research into this possibility would be worthwhile (e.g. using additional isotope systems, such as lead and sulphur). Whether the perpetrators were also local, or incomers to the region, is impossible to determine. Abundant historical evidence demonstrates that violence can occur between neighbours as well as between strangers (Stewart and Strathern 2002), and indeed that it may take more extreme forms in the former case, a phenomenon that Freud termed ‘the narcissism of minor differences’ (Blok 1998).

In terms of material resources, it is difficult to see what Mendip would have to offer to EBA communities that could not be obtained elsewhere. While well-known for its Romano-British lead mines, Mendip holds no tin or copper deposits, access to which could potentially have been contested (though there is no evidence for conflict where such ore sources do exist elsewhere in Britain and Ireland). Its karst landscape is not particularly fertile, being used primarily for pasture today and throughout the historic period. Its good drainage properties may have been attractive for pastoral communities, but any advantage this might offer seems entirely incommensurate with the scale and nature of violence seen at CWFS.

This leaves, albeit by default, the kinds of conflicts that arise from inter-personal and inter-community social and political interactions and, left unchecked, can lead to outbreaks of extreme violence. Examples include theft – especially of cattle in societies in which they are highly valued, which certainly applies to the British Neolithic and EBA – perceived slights and insults and charges of sorcery, all of which are strongly implicated in the ethnographic and historical literature as common proximate causes of lethal violence (Gat 1999; Keeley 1996). Cycles of tit-for-tat revenge can escalate, particularly when delayed, and may be out of all proportion to the original offence (cf. Hinton 1998). The fact that such motivations usually leave no visible archaeological traces does not make them any less real. That two individuals – and by inference others – suffered from plague raises the question of whether this may have been a factor in exacerbating a sense of fear in the region. And, while not a direct cause, it is possible that climate perturbations of the 4.2 ka event increased the frequency and severity of what would otherwise have been more manageable confrontations and so in that sense may have contributed to what unfolded at CWFS.

Conclusions

The EBA human skeletal assemblage from Charterhouse Warren is unique in Britain. At least 37 men, women and children were killed and dismembered, and probably partly consumed, before their remains were cast into a 15m deep shaft on Mendip together with a faunal assemblage dominated by domestic cattle. This was probably a single event occurring sometime between 2210 and 2010 cal BC. The victims appear to have been mainly local; we know nothing concerning the identity of the perpetrators. What brought about this extremely violent event remains unclear, but may have involved a spiralling cycle of revenge arising out of the social and political lives of Early Bronze Age individuals and communities, and hence to have had both antecedents and consequences. At this stage, our investigation has raised as many questions as it has answered. Further work is ongoing to shed more light on this decidedly dark episode in British prehistory.

Acknowledgements

This work was supported by a British Academy grant (SG163375). The radiocarbon dates were funded by NERC's NEIF programme (NF/2018/1/3). Isotope analyses were partially funded by a

British Academy Newton International Fellowship to T.F-C (NF17085). Thanks to Christopher Bronk Ramsey for advising on OxCal modelling, to Nadine Mattielli, Jeroen de Jong and Wendy Debouge (G-TIME, Université Libre de Bruxelles) for aid with the strontium isotope analyses, and to the anonymous reviewers for their comments. We also thank the Trustees of the Wells & Mendip Museum for permission to undertake this study on the remains in their care.

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Figure captions

Figure 1a. Location of Charterhouse Warren, Mendip, Somerset; b. schematic N-S section through Entrance Shaft showing locations of selected artefacts (Beaker vessel, sponge finger stones, flint dagger, antler spatula) (after Levitan et al. 1988, figs. 6, 21, 23, 25).

Figure 2a. Frontal bone with perimortem injury on left posterior; b. detail of injury with cutmarks below; c) internal view showing patinated bevel; d. cranium with perforation from injury to mid-frontal bone; e. closer view with radiating fracture lines; f. internal view showing patinated bevel; g. adult cranium; h. details of cutmarks running along mid-frontal; i. conjoining fragment of the right frontal bone with perimortem blunt force fracture.

Figure 3. Cutmarks on the posterior supraspinous fossa of an adult left scapula. Multiple parallel striations are visible within the cuts marked ‘b’.

Figure 4a. Right hemi-mandible of child age ca. 10 yrs; b. detail of cutmarks on ascending ramus.

Figure 5. Axis vertebrae showing multiple cutmarks.

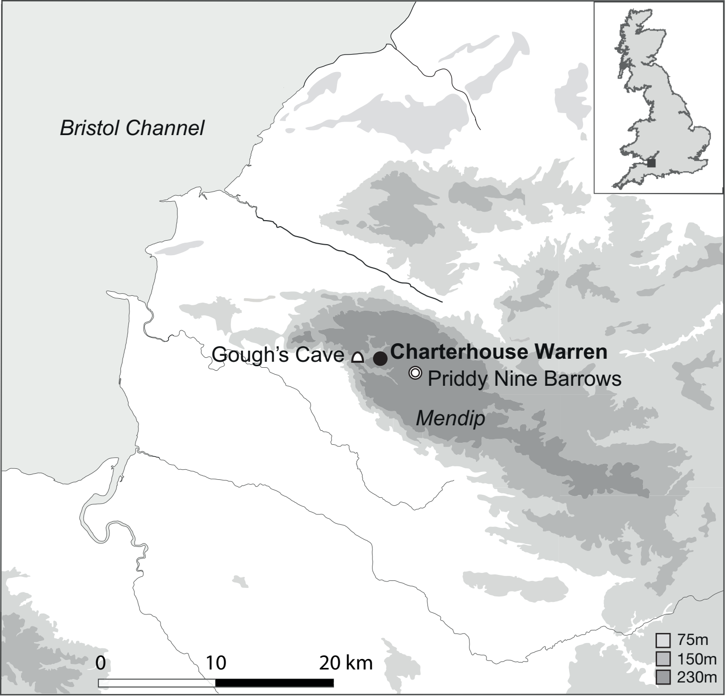
Figure 6. Cutmarks on distal left humerus.

Figure 7a. Conjoining sections of left humerus showing perimortem spiral fracture of the midshaft; b. detail of fracture margins.

Figure 8a. Distal femora with unusual breakage pattern involving symmetrical damage of the condyles; b. detail of percussion damage of the inferior surface of distal femora.

Figure 9. Elements showing damage attributed to possible human chewing (from left to right: metatarsal I, metatarsal, clavicle, metatarsal).

Figure 10. Bayesian model for radiocarbon-dated humans from CWFS, treated as two consecutive phases.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Gough's Cave
Charterhouse Warren
Priddy Nine Barrows
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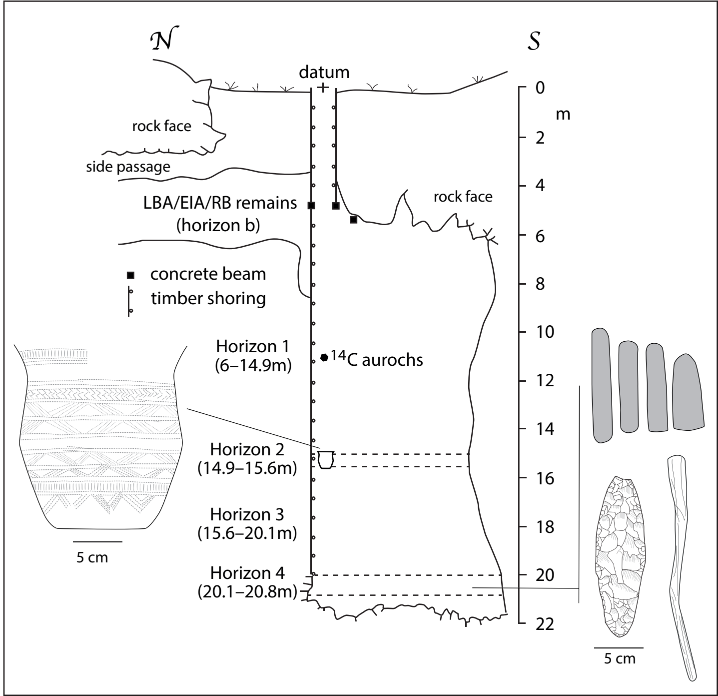
N
S
datum
rock face
side passage
LBA/EIA/RB remains
(horizon b)
rock face
concrete beam
timber shoring
Horizon 1
(6–14.9m)
14C aurochs
Horizon 2
(14.9–15.6m)
Horizon 3
(15.6–20.1m)
Horizon 4
(20.1–20.8m)
5 cm
5 cm
m
0
2
4
6
8
10
12
14
16
18
20
22


a
4769
b
c
d
1062
e
f
g
4612
h
i


a
5814
10 mm
a
b
b
1mm


4862
a
b


4918
5032
1 cm


4371
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274
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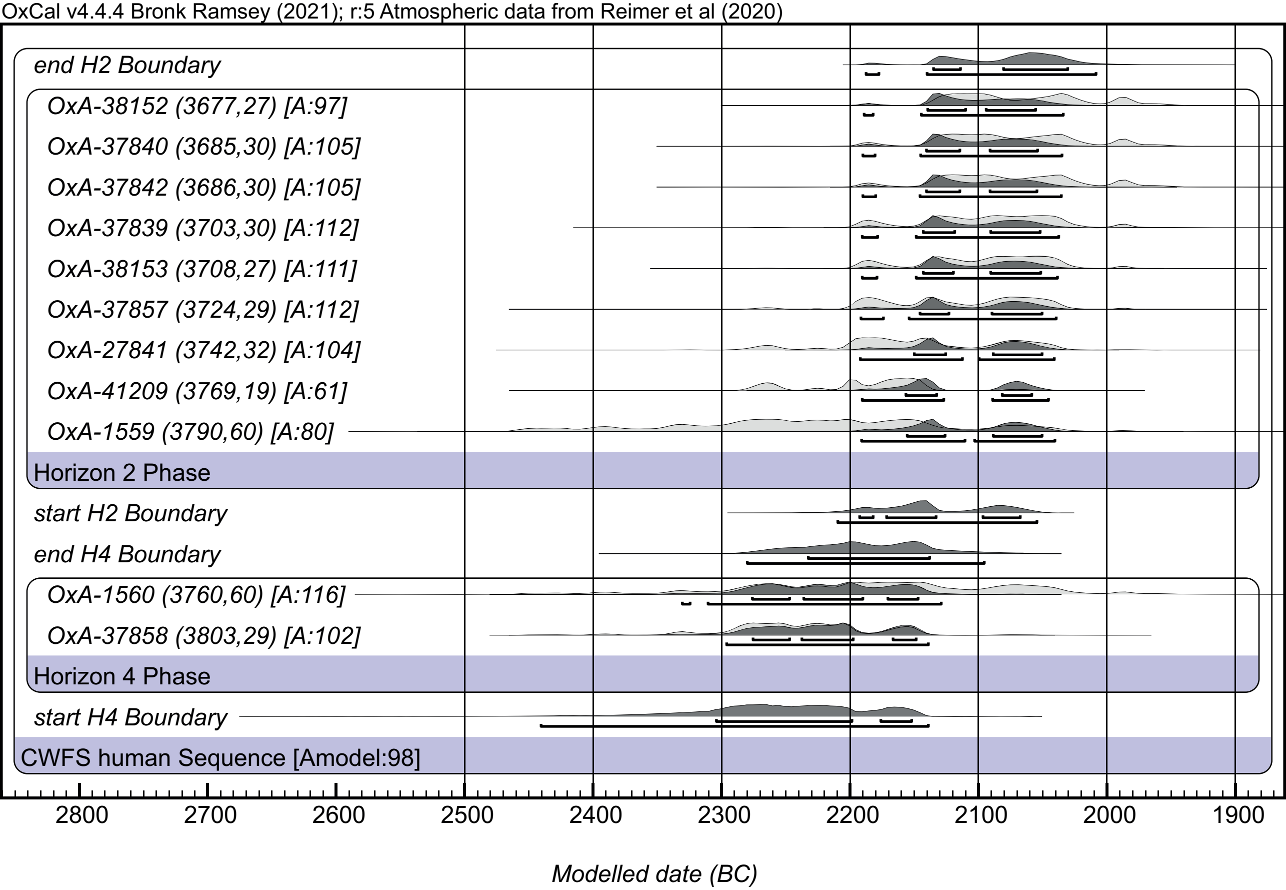
OxCal v4.4.4 Bronk Ramsey (2021); r:5 Atmospheric data from Reimer et al (2020)
end H2 Boundary
OxA-38152 (3677,27) [A:97]
OxA-37840 (3685,30) [A:105]
OxA-37842 (3686,30) [A:105]
OxA-37839 (3703,30) [A:112]
OxA-38153 (3708,27) [A:111]
OxA-37857 (3724,29) [A:112]
OxA-27841 (3742,32) [A:104]
OxA-41209 (3769,19) [A:61]
OxA-1559 (3790,60) [A:80]
Horizon 2 Phase
start H2 Boundary
end H4 Boundary
OxA-1560 (3760,60) [A:116]
OxA-37858 (3803,29) [A:102]
Horizon 4 Phase
start H4 Boundary
CWFS human Sequence [Amodel:98]
2800
2700
2600
2500
2400
2300
2200
2100
2000
1900
Modelled date (BC)