Journal of Archaeological Science 67 (2016) 14–24

Contents lists available at ScienceDirect

Journal of Archaeological Science

journal homepage: http://www.elsevier.com/locate/jas

New evidence for diverse secondary burial practices in Iron Age Britain: A histological case study

Thomas J. Booth [a,*], Richard Madgwick [b]

[a] Department of Earth Sciences, Natural History Museum, Cromwell Road, London, SW7 5BD, UK
[b] School of History, Archaeology and Religion, John Percival Building, Colum Drive, Cardiff, CF10 3EU, UK

ARTICLE INFO

Article history:
Received 17 July 2015
Received in revised form
7 January 2016
Accepted 23 January 2016
Available online xxx

Keywords:
Bone diagenesis
Bioerosion
Taphonomy
Funerary practices
Iron Age Britain
Histological analysis

ABSTRACT

Iron Age (c. 700 BC–43AD) funerary practice has long been a focus of debate in British archaeology. Formal cemeteries are rare and in central-southern Britain human remains are often unearthed in unusual configurations. They are frequently recovered as isolated fragments, partially articulated body parts or complete skeletons in atypical contexts, often storage pits. In recent years, taphonomic analysis of remains has been more frequently employed to elucidate depositional practice (e.g. Madgwick, 2008, 2010; Redfern, 2008). This has enhanced our understanding of modes of treatment and has contributed much-needed primary data to the discussion. However, only macroscopic taphonomic analysis has been undertaken and equifinality (i.e. different processes producing the same end result) remains a substantial obstacle to interpretation. This research explores the potential of novel microscopic (histological) methods of taphonomic analysis for providing greater detail on the treatment of human remains in Iron Age Britain. Twenty human bones from two Iron Age sites: Danebury and Suddern Farm, in Hampshire, central-southern Britain were examined and assessed using thin section light microscopy combined with the Oxford Histological Index (OHI). Results suggest that diverse mortuary rites were practised and that different configurations of remains were subject to prescribed, varied treatment, rather than resulting from different stages of the same process. Practices that may be responsible for these patterns include exhumation followed by selective removal of elements and sheltered exposure prior to final burial. Only one sample provided evidence for excarnation, a practice that has been widely cited as a potential majority rite in Iron Age Britain.

1. Introduction

Variation in the character of human remains recovered from British Iron Age sites suggests that the dead were subject to a diverse range of mortuary rites (Whimster, 1977, 1981; Wait, 1985; Cunliffe, 1988; Stead, 1991; Darvill, 2010). Unburnt human bones are most often recovered in varying states of articulation from storage pits and other non-funerary features within settlements and hillforts and rarely from discrete burial grounds (Whimster, 1981; Wait, 1985; Stead, 1991; Darvill, 2010). Formal cemeteries are largely absent from central-southern Britain, an area that clearly sustained a substantial population, with widespread settlement and relatively intensive agricultural production during the Iron Age (Sharples, 2010). The numbers of human remains can only account for a fraction of the individuals that occupied these sites, and it is likely that the practices represented do not reflect the rites afforded to the majority of the dead, which may not have left an archaeological record (Wait, 1985; Bradbury et al., 2016). Wait (1985: 90) suggested that an archaeologically visible rite was practised for only 6% of individuals in the early/middle Iron Age. The diverse, fragmentary and limited evidence for funerary ritual in Iron Age Britain has led to considerable debate on the majority rite and the modes of treatment for the minority that are represented archaeologically (Ellison and Drewett, 1971; Wilson, 1981; Wait, 1985; Hill, 1995; Carr and Knüsel, 1997; Craig et al., 2005; Carr, 2007; Madgwick, 2008; Tracey, 2012).

Excarnation through sub-aerial exposure, followed by disturbance and selective retrieval of skeletal elements represents the dominant interpretation of disarticulated and partially-articulated human bones (Stead, 1991; Carr and Knüsel, 1997; Craig et al., 2005; Knüsel and Outram, 2006; Redfern, 2008; Darvill, 2010). In strict terminology, excarnation refers to flesh removal (by any

* Corresponding author.
E-mail address: t.booth@nhm.ac.uk (T.J. Booth).

http://dx.doi.org/10.1016/j.jas.2016.01.010

means) but throughout this article it refers specifically to flesh removal through sub-aerial exposure, as is generally the case in archaeological literature. Excarnation might account for the dearth of human bones and may therefore have been the majority rite, as the weathering promoted by prolonged exposure would eventually destroy all physical remains (Redfern, 2008). Disposal in aqueous environments has been suggested as an alternative explanation for the majority rite (Madgwick, 2008; Sharples, 2010: 272). Analysis of surface modifications in Iron Age human bones from Danebury hillfort and Winnall Down enclosure in Hampshire indicates that the human assemblage was unlikely to have been produced by sub-aerial exposure (Madgwick, 2008). The sparse surface modification of the human bones suggests that they had not been exposed for long periods. However, small numbers of modified bones at Gussage-all-Saints and Maiden Castle, Dorset, have been taken as evidence for excarnation (Redfern, 2008). In both cases there is evidence that bodies decomposed in a primary depositional environment before selected skeletal elements or body parts were moved to a new context (secondary deposition). Whether excarnated or not, there is clear evidence for formalized treatment of human remains, as part of a suite of prescribed depositional practices (Hill, 1995; Madgwick, 2010; Sharples, 2010).

Labile skeletal elements, such as those of the hands and feet, disarticulate rapidly during bodily decomposition. Therefore, most skeletons recovered in complete anatomical articulation, can be assumed to represent bodies that were buried soon after death and not subject to post-depositional disturbance (Duday, 2006). A far broader range of processes may have been involved in the production of disarticulated or partially articulated human bone assemblages (e.g. excarnation, exhumation, disturbance, cannibalism). Specific taphonomic methods of analysis such as bone surface modification and skeletal part representation have been used to discriminate between different formation mechanisms, but they provide only a limited suite of information (see Carr and Knüsel, 1997; Craig et al., 2005; Knüsel and Outram, 2006; Redfern, 2008; Madgwick, 2008, 2010). Therefore there is still considerable uncertainty regarding the specific funerary rites practised by British Iron Age populations, as well as the degree of variability in practices within and between sites.

Understanding of Iron Age burial practices has been complicated by issues of equifinality. Therefore new lines of enquiry are required to improve interpretative resolution.

1.1. Taphonomic analysis of bone microstructure

Microscopic analysis of taphonomic modifications of bone microstructure has substantial potential for providing greater detail on the depositional treatment of remains and no research on British Iron Age populations has yet been published. Microscopic bioerosion, consisting of 'micro-foci of destruction' (MFD), is the most common form of diagenesis found in archaeological bone (Hackett, 1981; Turner-Walker et al., 2002). Three types of MFD (linear longitudinal, budded and lamellate) are associated with bacteria and represent the predominant form of bioerosion (Hackett, 1981; Balzer et al., 1997; Jackes et al., 2001; Turner-Walker et al., 2002). A fourth type of MFD, Wedl tunneling, relates to fungal attack from external sources in the depositional environment (Marchiafava et al., 1974; Hackett, 1981; Fernández-Jalvo et al., 2010).

The preservation of the internal bone microstructure does not correspond with the external condition of the bone and represents a distinct source of taphonomic information (Hedges et al., 1995; Hedges, 2002; Jans et al., 2004). Experimental studies of bacterial bioerosion in bone have suggested that it is an early taphonomic process, mostly confined to the first decade after death (Bell et al., 1996; Boaks et al., 2014; White and Booth, 2014). The extent of bacterial tunneling is unrelated to the chronological age of an archaeological bone and the diagenetic signature of early post-mortem bioerosion persists through deep time in environments where bone preserves (Hedges et al., 1995; Hedges, 2002; Jans et al., 2004; Turner-Walker, 2012). Microscopic analyses of ancient bone diagenesis have proven useful in discriminating between bones with variable taphonomic histories (Turner-Walker and Jans, 2008; Hollund et al., 2012; van der Sluis et al., 2014). However, microscopic methods have rarely been used to address questions surrounding funerary treatment (Parker Pearson et al., 2005).

Efforts to determine the specific processes that control bioerosion have been hampered by inexplicable variation in bacterial attack, particularly within and between skeletal elements (Hanson and Buikstra, 1987; Nicholson, 1996; Nielsen-Marsh and Hedges, 2000; Jans et al., 2004). This variation is still not properly understood, but evidence suggests it relates to differences in ratios of cortical and trabecular bone within and between skeletal elements (Hanson and Buikstra, 1987; Jans et al., 2004; Booth, 2014). Variation in bioerosion within archaeological bones from burial contexts that inhibit bacterial activity (e.g. anoxic or waterlogged sediments) will reflect environmental fluctuations rather than specific mortuary events (Turner-Walker and Jans, 2008; Hollund et al., 2012; van der Sluis et al., 2014). However, outside of these specific environments, the appearance and severity of bacterial bioerosion in archaeological and modern bone has been broadly linked to early taphonomic events. For instance, butchered archaeological bone is often free from bacterial bioerosion, whereas bone from complete articulated skeletons has usually been extensively tunneled by bacteria (Jans et al., 2004; Nielsen-Marsh et al., 2007; White and Booth, 2014; Booth, 2015). Several large-scale studies focused mainly on archaeological long bone shafts have replicated these results, suggesting that there is usually no significant variation in bioerosion within compact diaphyseal bone of the same element (Jans et al., 2004; Nielsen-Marsh et al., 2007; Booth, 2014, 2015). Micro-CT scans of archaeological infant human remains produced by one of the authors (Booth, in prep) show that the extent of bacterial bioerosion does not vary significantly across femoral diaphyses.

Bones from modern excarnated corpses exhibit limited or no bacterial tunneling (Bell et al., 1996; Fernández-Jalvo et al., 2010; White and Booth, 2014). These findings indicate that bacterial attack in archaeological bone will reflect processes that affect the degree of early bacterial soft tissue decomposition. Butchered bones would have been exposed to little, if any, soft tissue decomposition. Excarnated bodies are rapidly skeletonised by vertebrate and invertebrate scavengers within a few months, limiting bone exposure to soft tissue putrefaction. Burial protects the body from rapid skeletonisation, ensuring the bones are subject to prolonged bacterial attack over a number of years (Rodriguez and Bass, 1983, 1985; Bell et al., 1996; Campobasso et al., 2001; Dent et al., 2004; Vass, 2011).

This link between bone bioerosion and soft tissue decomposition provides strong evidence that non-Wedl MFD are produced by an organism's enteric gut microbiota. These bacteria transmigrate around a cadaver in the first few days after death and go on to permeate the bone microstructure (Child, 1995a, 1995b; Gill-King, 1997; White and Booth, 2014). They are largely responsible for the early putrefaction stage of soft tissue decomposition (Child, 1995b; Bell et al., 1996; Gill-King, 1997). Recent studies of modern and archaeological bone have established that putrefactive bacteria are a principal cause of non-Wedl MFD (Jans et al., 2004; Nielsen-Marsh et al., 2007; Boaks et al., 2014; White and Booth, 2014). There is still debate on the role of soil bacteria, which may produce similar patterns of bioerosion (Turner-Walker, 2012), but a growing body of evidence supports the dominant impact of endogenous gut