7. Bone modification and the conceptual relationship between humans and animals in Iron Age Wessex

Richard Madgwick

Abstract

Bone modification has generally been marginalised as a tool for the interpretation of osseous material in complex archaeological records. As a result of the manner in which human and animal remains are traditionally studied and reported on, the analysis of taphonomic processes which affect the character of specimens between death and incorporation into forming deposits is often confined to butchery, burning and fragmentation. This paper argues that current methods of osteoarchaeological analysis fail to recognise the potential of a substantial and easily accessible source of information in paying little attention to the processes of weathering, gnawing, trampling, abrasion and longitudinal/spiral fracturing. More detailed taphonomic assessments have tended to focus on one specific process to answer a particular research question rather than taking a holistic approach to pre-depositional affects (e.g. Outram 2001). Consequently biographies of skeletal material are only partially complete, as the period in the material existence of bone prior to subterranean deposition is not fully investigated. The aforementioned taphonomic processes can provide substantial evidence for human decision making regarding the treatment of different classes of remains.

This research explores the potential of holistic taphonomic analysis in a sample of c.9500 human and faunal specimens from the Iron Age sites of Winnall Down and Danebury. These sites were selected as they are located in the heart of Wessex, an area about which there has been considerable discourse and disagreement regarding the nature of human and animal bone treatment in the Iron Age. Through comprehensive taphonomic analysis, highly regulated, socially circumscribed behaviours surrounding bone handling were revealed. These results are suggestive of separate practices relating to the treatment of human and faunal remains with the latter exhibiting significantly greater evidence of exposure. The analysis of bone modification in features containing both human and faunal remains reveals a blurring of the boundary between human and animal identities, as the treatment of the two classes of material differs to a significantly lesser degree than when analysing the entire assemblage. Therefore each class of material is subjected to a more closely related mode of treatment. This might be seen as indicative of a conceptual proximity of human and faunal remains.

Iron Age Deposits in Wessex

This paper demonstrates the potential of commonly marginalised taphonomic processes in the understanding of complex archaeological records. It opens with a brief background on human and faunal remains in the Iron Age archaeological record of Wessex and is followed by a summary of the processes of weathering, abrasion, trampling, gnawing and fracturing with data analysis and interpretations concluding the paper.

The treatment of human and animal remains prior to and during deposition in Iron Age Wessex is notable. Human remains are recovered in a range of distinctive configurations, including isolated bones and skulls, disarticulated limbs, partial inhumations or complete inhumations from ditches, enclosure boundaries, ramparts and most commonly, pits (Hill 1995, 13). In addition, in central/southern England, finds of human remains account for only a small proportion of settlements' inhabitants, with Wait (1985, 90) suggesting that those recovered account for only approximately 6% of the population in the early/middle Iron Age. Faunal material is regularly recovered in a manner uncharacteristic of domestic refuse. Deposits do not only contain disarticulated material of the main domesticates, but also fully articulated skeletons, articulated limbs and skulls. Also bones of dogs and horses, as well as right sided elements are over-represented compared to their number in the 'normal' assemblage on site (Cunliffe 1995; Cunliffe and Poole 1995; Grant 1984a; 1984b, Green 1992; Morris 2008; Woodward 1993). Human and faunal remains are frequently recovered in association with each other (Figure 7.1), and with a range of other cultural debris, most commonly pottery, but also quernstone fragments, metalwork, worked bone, plant remains, spindle whorls and loomweight fragments (Hill 1995, 20-22; Walker 1984). These deposits are predominantly found in the Wessex region of southern England, particularly Dorset, Wiltshire, Oxfordshire and Hampshire (Wait 1985, 88) and are being noted in increasing numbers elsewhere in England. It is important to emphasise the diversity and complexity of depositional practice, as all manner of configurations of associations, remains categories and feature types have been found on both non-hillfort settlements and hillfort sites.

In the past, deposits containing human remains and/or articulated faunal material have often been classified as 'ritual' (Grant 1984b; Grant 1991; Hambleton 1999, 11; Wilson 1999) or 'special' (Grant 1984a; Hill 1996). However the validity of using unusual configurations of skeletal material in the identification of ritual is unproven and consequently this approach provides little more than a convenient way of dividing Iron Age deposits into 'atypical' and 'typical' at initial analysis. This division is based on deposit content and articulation level and fails to

Figure 7.1 Pit 923, from Danebury showing the mass of material in various states of articulation (reproduced with the kind permission of the Danebury Trust).

consider taphonomic modification. Therefore this demarcation may oversimplify these heterogeneous groups of material, as it is possible that all deposits exhibit structure in their treatment and provide evidence of human decision making far beyond a mere concern for optimal disposal. Consequently this research involves the analysis of material from a range of deposits, both those defined as ritually significant and domestic. A holistic analysis of taphonomic modification has the potential to reveal the choices made in the pre-depositional treatment of different classes of remains and the way in which these are a reflection of the relationship between humans and animals.

Taphonomic Modifications

This section discusses issues surrounding preservation in order to demonstrate the potential contribution of taphonomic analysis and to highlight possible problems and solutions in data collection, analysis and interpretation. A complete discussion of taphonomy cannot be presented within the confines of this paper and therefore only a shortened summary of each process is offered.

Gnawing

Gnawing is often the most common and earliest occurring of taphonomic processes (Fernández-Jalvo *et al.* 2002; 355). This modification is generally indicative of ground extract bones from subterranean contexts. Canids habitually gnaw all bones, including skulls, mandibles and horn cores. Other agents of gnawing include humans (Binford 1981, 147), pigs (Greenfield 1988) and, to a lesser extent, deer (Kahlke 1990; Kierdorf 1994; Sutcliffe 1977) and other non-carnivorous ungulates (Brain 1967; Fernández-Jalvo *et al.* 2002, 356; Sutcliffe 1973). Depending on scavenger and tooth class, a range of marks can be produced including striations, furrows, pits, punctures, square-based grooves and ragged edges (Buikstra and Ubelaker 1994, 98; Fisher 1995; Smith 2006). In spite of the variation in marks, gnawing is easily distinguished from other taphonomic processes when using low powered magnification (Fisher 1995). Studies have demonstrated that scavengers gnaw bones in patterned ways (Bonnischen 1973; Haynes 1980; Hill

1976; Miller 1969; 1975; Sutcliffe 1973, 1977) by targeting areas rich in cancellous bone such as epiphyses, vertebral bodies and iliac crests (Bochenski and Tornberg 2003; Brain 1980; 1981, 21; Gifford-Gonzales 1989; Haynes 1980; Johnson 1989; Laudet and Fosse 2001; Maguire *et al.* 1980). However contrary to this, in studying fossil bones from Spain, Andrews and Fernández-Jalvo (1997, 199) found that although articular ends were favoured by scavengers, there was no relationship between the robusticity of elements and gnawing prevalence.

Poorly preserved bone tends to exhibit less evidence of gnawing and experiments by Haynes (1980) demonstrated that severe weathering obscures gnawing through the removal of the outer layer of lamellar bone. However Potts (1986) counters this, as his studies indicated both cut and gnaw-marks to be evident on severely weathered bone. Ground level exposure can take place for extended periods without gnawing occurring, as demonstrated in an experiment by Andrews and Cook (1985, 679), where no gnawing evidence was present on a well preserved cow skeleton exposed for 7½ years in Britain. Therefore the nature of the environment and its fauna has a substantial affect on the degree of gnawing within an assemblage.

Weathering

Weathering is defined as the process whereby microscopic organic and inorganic bone components are separated and destroyed by physical and chemical agents operating *in situ*, once flesh and connecting tissue have degraded (Behrensmeyer 1978). This modification is strongly indicative of sub-aerial exposure, as most analysts agree that the impact of weathering in subterranean contexts is negligible (e.g. Behrensmeyer 1978; Maat 1993). The process is characterised by the cracking, exfoliation, splitting and disintegration of bone (Fisher 1995; Steele and Carson 1989; White 2000, 411) and split-line cracks on antlers and horns (Dunbar *et al.* 1989). Cracking is generally organised longitudinally, and is most abundant on long bone shafts, eventually leading to split-line fractures (Andrews and Fernández-Jalvo 1997; Tappen 1969; 1971; 1976). Experiments indicate that weathering is a progressive and irreversible process that follows a linear pattern regardless of environment (Andrews 1995; Behrensmeyer 1978; Brain 1967; Isaac 1967; Sokal and Rohlf 1969, 12; Tappen and Peske 1970; Voorhies 1969).

Exposure of bone does not always cause weathering cracks, as experiments have demonstrated that skeletal material can be rapidly buried through disturbance (Andrews 1995; Behrensmeyer 1978) and short term exposure in mild environments leaves no evidence of weathering (Lyman 1994, 364). A range of studies has highlighted causes of variation in preservation in different environments (Hill 1989). Sunlight, freezing, vegetation, temperature and texture of the sediment; microbial activity and repeated wetting and drying all impact upon weathering rates (Brain 1981; Brothwell 1981, 7; Child 1995; Guadelli and Ozouf 1994; Hedges 2002; Janaway 1990; Lam 1992; Littleton 2000; Lyman 1994, 358; Micozzi 1986; Nicholson 1996; Ortner *et al.* 1972; Tappen 1994; Von Endt and Ortner 1984). Bone degrades more quickly in open habitats due to wide temperature and moisture fluctuations whereas consistently very moist or dry environments decelerate the process (Behrensmeyer 1978; Hedges 2002) as does shelter (Janaway 1987).

Experiments have also demonstrated that boiling increases the porosity of bone and consequently increases the weathering rate, although conventional boiling times of 1-9 hours have very little effect (Roberts *et al.* 2002). The shape of elements or parts of elements is another contributing factor (Henderson 1987). Tubular elements like long bones are more susceptible to weathering with compact elements (such as carpals) being less frequently affected (Giffford-Gonzales 1989; Lambert *et al.* 1985; Potts 1986; Von Endt and Ortner 1984). Weathering evidence is consequently usually most common on long bones and elements such as the pelvis, mandible, scapula and calcaneus and when all elements are assessed, Potts (1986) has demonstrated that results tend to be biased towards a lack of weathering. In spite of the range of factors affecting the rate of weathering, experiments by Miller (1975) have shown a statistically significant correlation between exposure duration and weathering stage.

Trampling

Trampling results from the disturbance of skeletal material on the ground surface by human and animal agents. This causes shallow, sub-parallel striations on bones, due to the etching of material by soil particles (Andrews 1995, 148; Andrews and Fernández-Jalvo 1997; Behrensmeyer *et al*. 1986; Courtin and Villa 1982; Fiorillo 1989; Olsen and Shipman 1988). As striations are not created by hooves, which are softer than bone, but rather by particles in the soil, certain sediments induce greater evidence of trampling. Effects tend to be more severe in sandy, coarse sediments (Behrensmeyer *et al.* 1989; Denys 2002; Fiorillo 1989). Evidence of trampling is strongly indicative of (at least) short term exposure of bone at ground surface level.

The effects of trampling have often been marginalised in archaeological research (Behrensmeyer *et al.* 1989). However some researchers have cited the process as being a major cause of fragmentation (e.g. David 1990; Haynes 1980; Lyman 1994, 377; Stiner *et al.* 1995; Walters 1988). Spiral fractures, suggestive of fresh bone breakage and longitudinal fractures, indicative of dry bone breakage have been proposed as evidence for trampling (Agenbroad 1989; Saunders 1977). However, experiments by Fiorillo (1989), Johnson (1989) and Outram (2001) have demonstrated that such fractures and patterns of recovery have a range of causes, including butchery for marrow extraction (spiral fractures) and cryoturbation (longitudinal fractures).

It has commonly been stated that striations caused by trampling can at times be confused with cut-marks (e.g. Behrensmeyer *et al.* 1986; Bunn 1981; Fiorillo 1984, 1989; Lyman 1994, 377; Oliver 1989; Olsen and Shipman 1988; Potts and Shipman 1981). However, research has demonstrated that trampling evidence can be distinguished from butchery marks and sedimentary abrasion, as trampling tends to cause large numbers of closely spaced, shallow striations on affected fragments, exhibiting considerable variation in depth, width and direction (Andrews 1995; Andrews and Cook 1985; Olsen and Shipman 1988). Research also indicates that smaller skeletal elements, such as carpals and tarsals generally exhibit less trampling evidence, probably as they easily become covered by sediment (Olsen and Shipman 1988; Potts 1986). Following this, exposure of bones need not always induce trampling marks, as skeletal material can be rapidly buried in soft soils (Fiorillo 1989; Olsen and Shipman 1988), areas with dense vegetation protect bones (Fiorillo 1989) and some zones within sites are less commonly accessed.

Abrasion

Abrasion is defined as the gradual erosion of a bone's surface by any agent through physical force (Bromage 1984) and is characterised by smoothness, progressing to a glossy polish through the removal of external lamellar bone (Behrensmeyer 1982). In addition, broken edges become smooth and rounded (Behrensmeyer 1988) and a loss of surface detail occurs (Behrensmeyer 1990). Abrasion has a diverse aetiology and although most causes are strongly indicative of ground surface exposure, as noted below, some processes occur in subterranean contexts. Causes include contact with flowing water (Bromage 1984; Denys 2002; Nicholson 1992), human and animal movement (Andrews and Fernández-Jalvo 1997; Argast *et al.* 1987; Brain 1981, 15; Haynes 1980; Lyman 1994, 381), carnivore licking (Haynes and Stanford 1984), using bone as a tool (Fisher 1995), exposure to acidic conditions (Gordon and Buikstra 1981), earthworm activity (Armour-Chelu and Andrews 1994) and the churning of material in shallow subterranean contexts (Haynes 1980). In general it is very difficult to differentiate between causes of abrasion (Olsen and Shipman 1988), although Bromage (1984) attempted to characterise the micromorphology of different sources. Research has demonstrated that weathered material is more susceptible to abrasion (Andrews 1995, Behrensmeyer 1990; Cook 1995) due to loss of elasticity, once the organic component of bone has degraded (Martill 1990).

Fracturing

Longitudinal and spiral fractures were also recorded. Longitudinal fractures can arise through the weakening of bone by weathering or erosion combined with trampling or disturbance (Andrews and Fernández-Jalvo 1997; Tappen 1969, 1971, 1976). Spiral fractures can be caused by the trampling of fresh bones (Agenbroad 1989; Saunders 1977). However these distinctive fractures may also result from long bones being intentionally smashed when fresh for the extraction of marrow (Outram 2001). Consequently interpretation of these fracture patterns is complex, as both can occur independently of agents of trampling and are not always indicative of sub-aerial exposure.

Summary

Consideration of taphonomy now plays an important role in the analysis and interpretation of human and faunal material. However, in spite of this, most taphonomic processes remain far from fully understood. Standardised stages and vocabulary are required for all aforementioned processes to enable reliable comparisons, although the diversity of marks made by processes such as trampling and abrasion have complicated such attempts in the past (Fisher 1995). The complexity of patterns of preservation in similar contexts has long been recognised (e.g. Rietti and Ruffer 1912), and the diversity and unpredictability of taphonomic processes must not be underestimated. The tendency to look for comprehensive laws in bone preservation is erroneous (Hill 1989), as every microenvironment has a unique suite of factors influencing preservation. Patterns in preservation must be seen as resulting from a multifarious interaction between wide-ranging variables (Henderson 1987). Consequently all factors affecting the rate and nature of processes must be carefully considered in interpretation, as reconstructing taphonomic histories is a complex task. However, except in certain exceptional circumstances, the taphonomic modifications described above are indicative of sub-aerial exposure and in analysing a range of taphonomic processes on a substantial sample, the patterns revealed reflect intentional treatment by human agents.

Methodology

This research presents a focused taphonomic analysis of remains from the sites of Winnall Down and Danebury, in order to shed light on the conceptual relationship between human and animal bones, as reflected in their pre-depositional treatment. Data collection was undertaken using a 10x magnification hand lens under the light of a 60 watt lamp. Although taphonomic overprinting undoubtedly caused some modifications to be overlooked (Shipman 1989), every effort was made to study the entire surface of each fragment systematically.

Table 7.1 Stages for the identification of different levels of gnawing severity.

Stage 1, Slight gnawing, with intermittent pits, punctures, furrows or square-edged grooves evident on the bone.
Stage 2, Moderate gnawing, with around half of the affected edge of a fragment covered with gnaw-marks. Ragged edges begin to appear in worst affected areas.
Stage 3, Severe gnawing, with at least 80% of the affected edge covered with gnaw-marks. This causes the removal of epiphyses on long bones and will leave a ragged edge at the affected end of the diaphysis.

Feature type, depth, element, species, age class, burning and butchery were also recorded for each fragment, as these affect the prevalence of other processes and may have a role in dictating modes of treatment. As no accepted standards exist for the recording of gnawing, the author's own stages were applied (Table 7.1).

Data collection for weathering used Behrensmeyer's (1978) stages for medium/large mammals, with the most advanced stage covering more than $1cm^2$ of weathering damage recorded. Although these stages impose arbitrary divisions on a continuous process, they remain the most appropriate way of quantifying weathering, as although the temporal meaning of weathering data has been questioned (Potts 1986), for the purposes of this research it is not necessary to put a timescale to exposure, but rather to note variation in different classes of remains. Due to the complexity of interpreting trampling, a presence/absence analysis was employed rather than grading severity. This was deemed appropriate as severity of trampling does not reflect exposure duration. When striations were evident, particular care was taken in distinguishing them from other modifications following the guidance of Andrews and Cook (1985). Biases relating to soil type were not considered to have had a substantial effect on the degree of trampling evidence, as both Danebury and Winnall Down are located on the Hampshire chalkland.

Abrasion was also scored as either present or absent. This was deemed appropriate as the process need not occur in a linear pathway and the rounding of fragmented ends of bones cannot be compared to the polished appearance of a section of diaphysis in terms of severity. As most causes of abrasion indicate exposure, it was not critical to differentiate processes for the purposes of this research. Fiorillo's (1988) abrasion indices were not employed in this research, as stages were produced using Nebraskan material and cannot be confidently applied to British material, as they are not experimentally determined (Cook 1995). For the purposes of this paper, longitudinal fractures and spiral breaks were not distinguished, as both may provide evidence for trampling. Fractures were recorded for mandibles and all post-cranial elements except for carpals and tarsals, which are generally too small for fracturing to occur through trampling. Bones of the cranium were also not included, as fragments were generally too small to be sure of the direction of the fracture.

The Sample

9,493 bone fragments were analysed of which 5,183 (967 human, 4,216 animal) were from Winnall Down and 4,310 from Danebury (1,934 human, 2,376 animal). These sites were selected as they are both in the heartland of the central/southern region that has been the focus of so much research on the deposition of skeletal material (and little on bone modification) in the past. The prehistoric settlement of Winnall Down, Hampshire is situated less than 2km north-east of Winchester and was fully excavated in 1976-9 as part of the M3 construction project. The main occupation of the site occurred throughout the Iron Age and early Roman period (Fasham 1985). Excavations yielded in excess of 14,000 animal bone fragments (Maltby 1985). Human skeletons from the site represent 31 individuals with a further 78 instances of scattered bone being recovered (Bayley *et al.* 1985). The hillfort of Danebury is situated near Andover in the chalkland of Hampshire. The site was settled throughout the Iron Age with occupation peaking in the early and middle phases (Cunliffe 2003, 161-2). In excess of 240,000 animal bone fragments were recovered from the site (Grant 1991). Three hundred depositions of human remains representing a minimum of 91 individuals were recovered, although in reality, due to the large amount of disarticulated material, the figure is likely to be far higher (Cunliffe 1991b).

A selection of features containing only humans, only animals and both humans and animals were sampled from Winnall Down. Human remains from features without faunal material were all in an articulated state. The sample of mixed features and features containing only faunal material included both articulated and disarticulated remains, although in various instances features comprised only disarticulated material. Features included quarry pits, scoops and postholes, although the vast majority of sampled remains came from storage pits. This was the case, as the majority of remains from the site derived from these features (Maltby 1985) and they also provided most examples of features containing both human and faunal remains, a crucial feature type for the purposes of this study. Due to incomplete archived material, insufficient human bone was sampled from Winnall Down for statistical testing to be carried out. Therefore two charnel pits that were rich in human bone were sampled from Danebury. Overall 1593 fragments were analysed from features containing only faunal remains, 7405 from mixed features and 495 from features containing only human material.

Analysis

Statistical tests (either Chi² or Mann-Whitney) were systematically applied to the data to reveal patterns in treatment of different classes of remains. Chi² tests of difference were applied for nominal datasets and Mann-Whitney for ordinal datasets. For weathering and gnawing tests, where samples were of sufficient size, all stages were included in the statistical analysis. However, when expected values were prohibitively low, data was pooled to conduct presence/absence analyses. As highlighted in the taphonomy section, research has demonstrated that long bones are more susceptible to weathering and analysis tends to be biased towards a lack of weathering when all elements are included (Giffford-Gonzales 1989, Lambert *et al.* 1985; Potts 1986; Von Endt and Ortner 1984). Consequently, when samples were of a sufficient size, tests concerned with weathering were also conducted on long bones only. Graphs summarising gnawing and weathering do not show stage 0 modification (unmodified material), as the omission of this category increases the clarity of patterns in other stages. However, all unmodified material was included in testing. Details of each statistical test are presented in the appendix.

Initially tests were carried out to assess differences in the prevalence of each modification between humans and animals. Results demonstrate significant differences for weathering (T1, $p = 0.000$), gnawing (T2, $p = 0.000$), abrasion (T3, $p = 0.000$), trampling (T4, $p = 0.000$) and longitudinal/spiral fracturing (T5, $p = 0.000$), with faunal remains being more commonly affected in every instance. This indicates that animal remains were exposed to a greater degree than human skeletal material. A series of tests was undertaken to ascertain whether other factors could account for the apparent differences. The level of articulation is one such factor, as significantly more disarticulated faunal material was sampled than disarticulated human bone (T6, $p = 0.000$). Unsurprisingly the difference in the degree of weathering of articulated and disarticulated fragments is significant (T7, $p = 0.000$), with the former exhibiting less modification. Similar significant differences are evident in gnawing (T8, $p = 0.000$), abrasion (T9, $p = 0.000$), trampling (T10, $p = 0.000$) and longitudinal/spiral fracturing (T11, $p = 0.000$). Therefore articulation levels have a significant effect on bone modification, with disarticulated material exhibiting greater evidence of exposure. This is to be expected, as for bones to remain in articulation, they must be joined by connecting tissue, and would therefore be, to some extent, protected from modification.

To be sure of the effect of articulation levels on modification the difference in weathering of articulated animal and human remains was tested. Results reveal no significant difference (T12, $p = 0.511$). However, testing the difference in weathering in disarticulated remains demonstrates animals to be significantly more modified (T13, $p = 0.000$) and thus exposed to a greater degree. This is also the case when only long bones are analysed (T14, $p = 0.000$). Small numbers of gnawed human bones prevented analysis of gnawing in articulated remains. However, analysis shows a significant difference in disarticulated material (T15, $p = 0.000$), again with faunal remains exhibiting greater evidence of exposure. Differences in the treatment of human and faunal remains are evident in disarticulated material only and consequently the further inclusion of articulated bone groups would only serve to distort results. Therefore further analysis was conducted on disarticulated remains only. The clear difference in modification between disarticulated human and faunal material is summarised in Figures 7.2-7.4.

The clear difference in human and animal modification suggests that no conceptual relationship exists between human and faunal remains in Iron Age Wessex, as it seems that each class of remains was subjected to entirely separate pre-depositional practices. However, in order to take a more thorough, holistic approach to revealing any symbolic connection, analysis is extended to taphonomic variation in material from features which contain both human and faunal remains (referred to as mixed features) and those which contain only faunal material (referred to as uniform features). This analysis has the potential to elucidate how the association of human material affects the way in which faunal material is treated. No testing could be carried out on features containing only humans, as all those sampled contained only articulated or partially articulated material.

As expected weathering (T16, $p = 0.000$), gnawing (T17, $p = 0.000$), abrasion (T18, $p = 0.008$), trampling (T19, $p = 0.000$) and longitudinal/spiral fracturing (T20, $p = 0.000$) are significantly more prevalent in animal rather than human fragments from mixed features. However, distinct differences are also evident in the treatment of faunal remains from mixed features and those from uniform features, with both weathering (T21, $p = 0.000$) and gnawing (T22, $p = 0.003$) being significantly more prevalent in material from uniform features (Figures 7.5 and 7.6). Weathering differences remain significant when only long bones are analysed (T23, $p = 0.000$).

As presented in Figures 7.7 and 7.8, abrasion (T24, $p = 0.008$), trampling (T25, $p = 0.000$) and longitudinal/spiral fracturing (T26, $p = 0.000$) are also all more common on animal bone from uniform features. As all modifications are significantly more frequent on faunal material from uniform features rather than mixed features, the association of human bone appears to impact upon the way that animal remains are treated, with those in association exhibiting significantly less evidence of exposure.

It is not possible to discuss all the research findings within the confines of this paper. However, the results

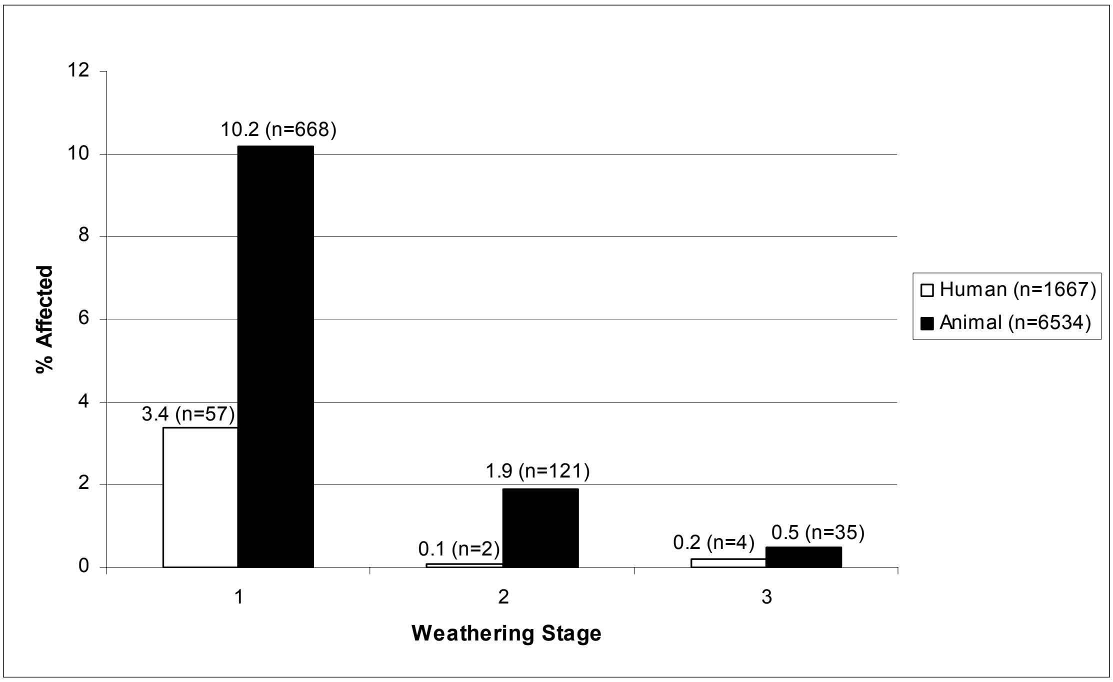

Figure 7.2 The percentage of disarticulated human and faunal remains in different weathering stages (stage 0 not included in order to emphasise patterns in the prevalence of other stages, 87.4% of faunal fragments show no weathering, as do 96.2% of human specimens).

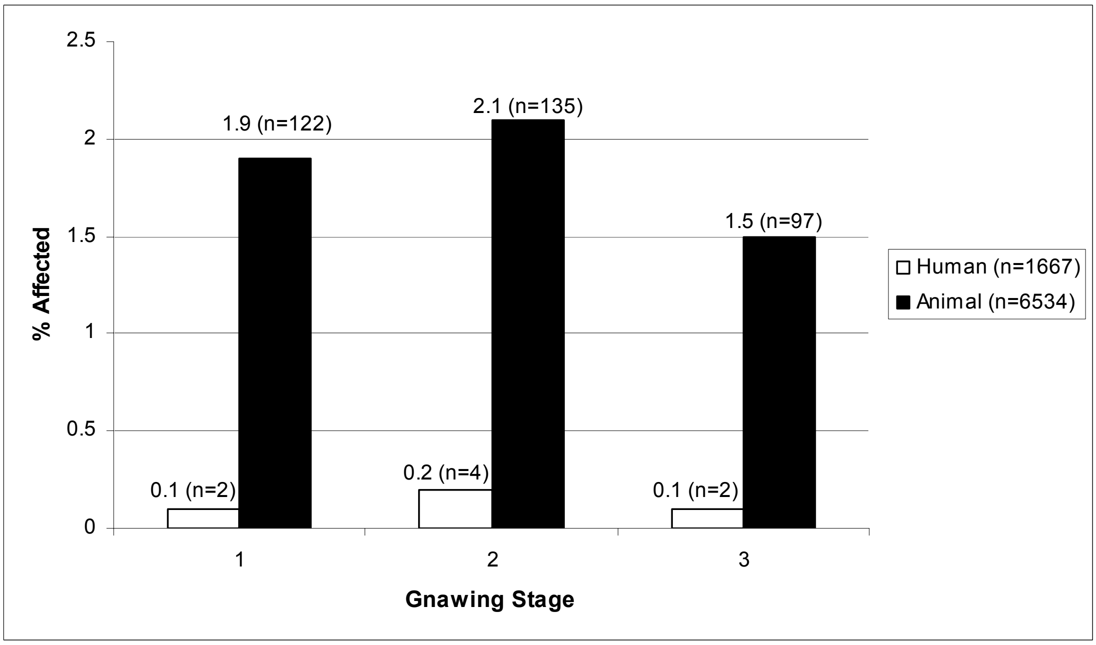

Figure 7.3 The percentage of disarticulated human and faunal remains in different gnawing stages (stage 0 not included in order to emphasise patterns in the prevalence of other stages, 94.6% of faunal fragments exhibit no evidence of gnawing, as do 99.5% of human specimens).

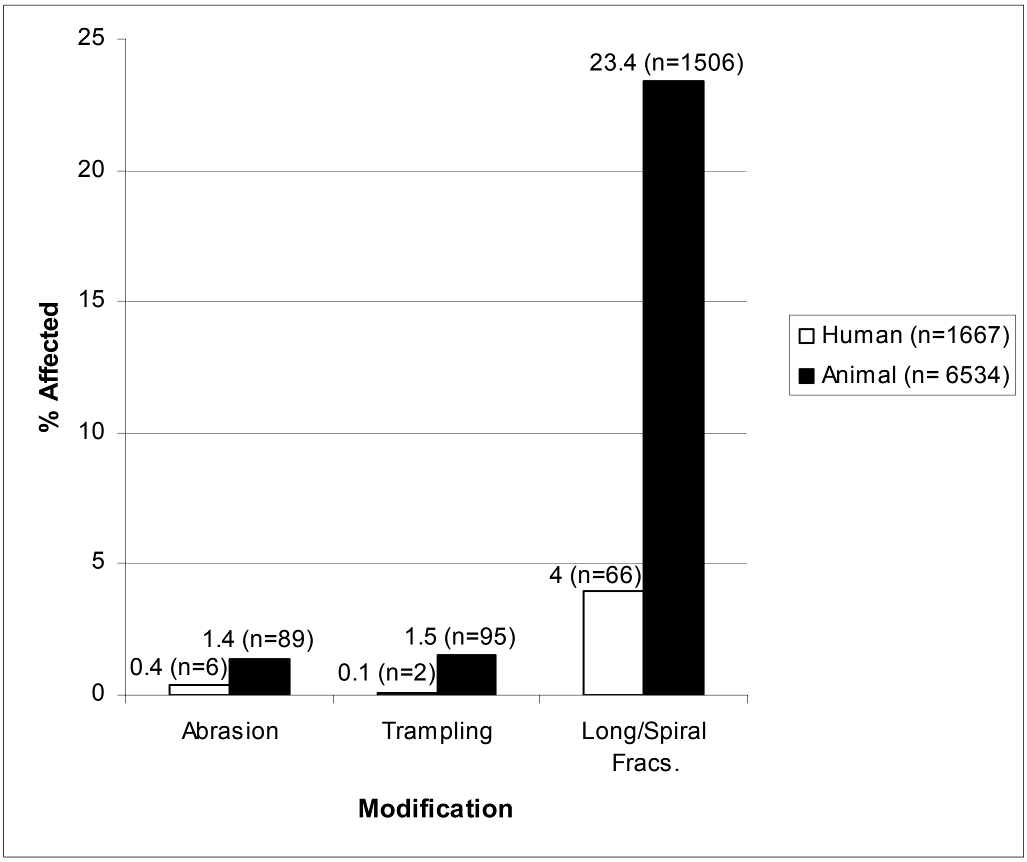

Figure 7.4 The percentage of disarticulated human and faunal remains affected by abrasion, trampling and longitudinal/spiral fracturing.

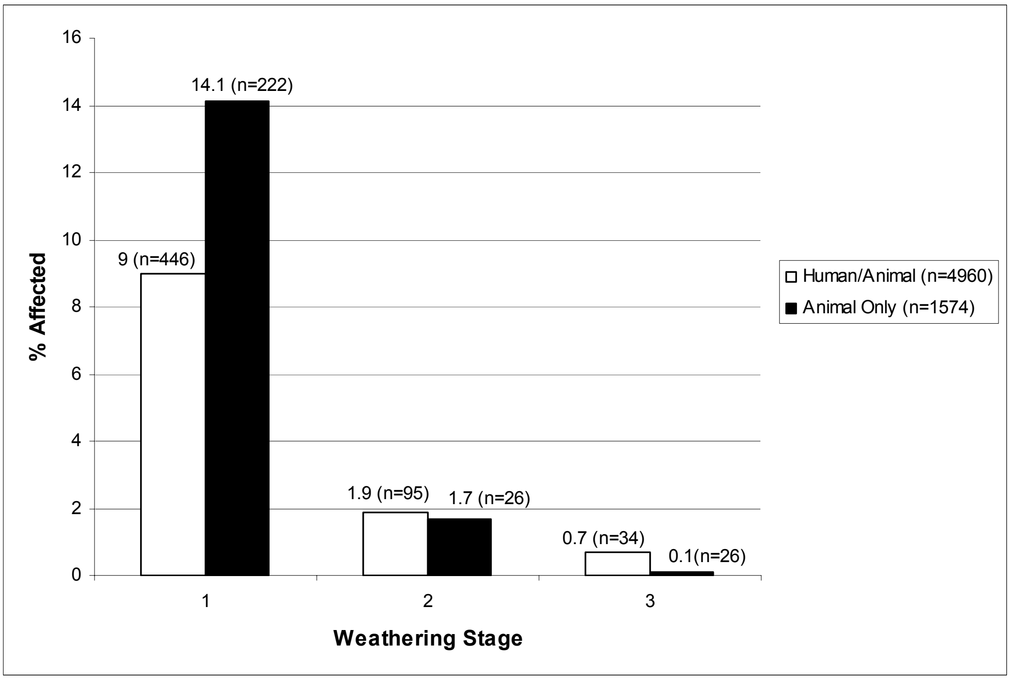

Figure 7.5 The percentage of animal bones in uniform features (those that contain only faunal remains) and mixed features (those that contain both human and faunal remains) in different weathering stages (stage 0 not included in order to emphasise patterns in the prevalence of other stages, 88.4% of remains from mixed features exhibit no weathering evidence, as do 84.1% of fragments from uniform features).

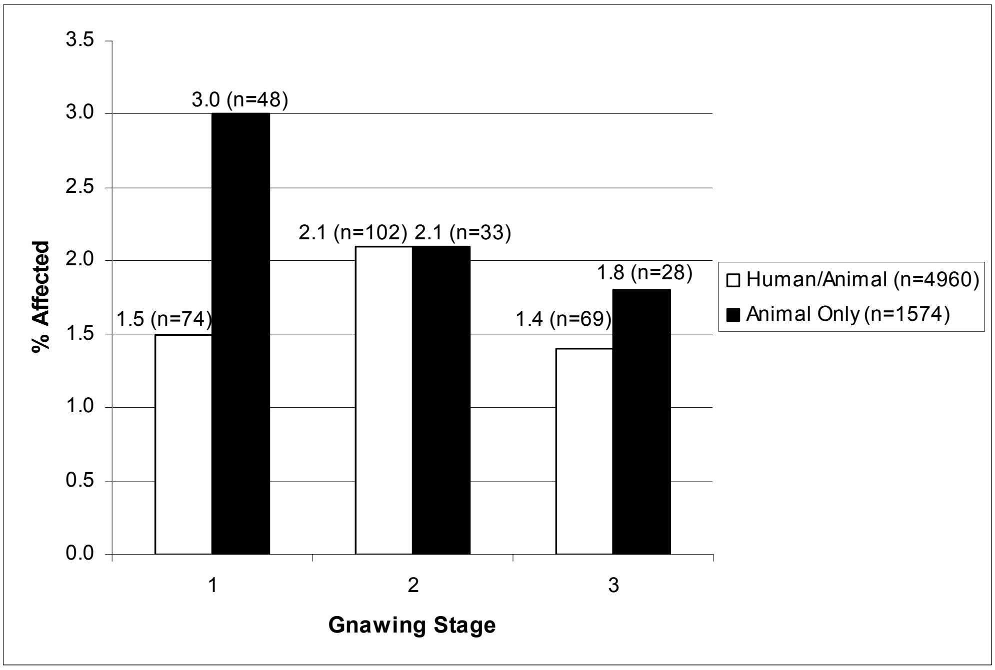

Figure 7.6 The percentage of animal bones from uniform features (those that contain only faunal remains) and mixed features (those that contain both human and faunal remains) in each gnawing stage (stage 0 not included in order to emphasise patterns in the prevalence of other stages, 95% of remains from mixed features exhibit no evidence of gnawing, as do 93.1% of fragments from uniform features).

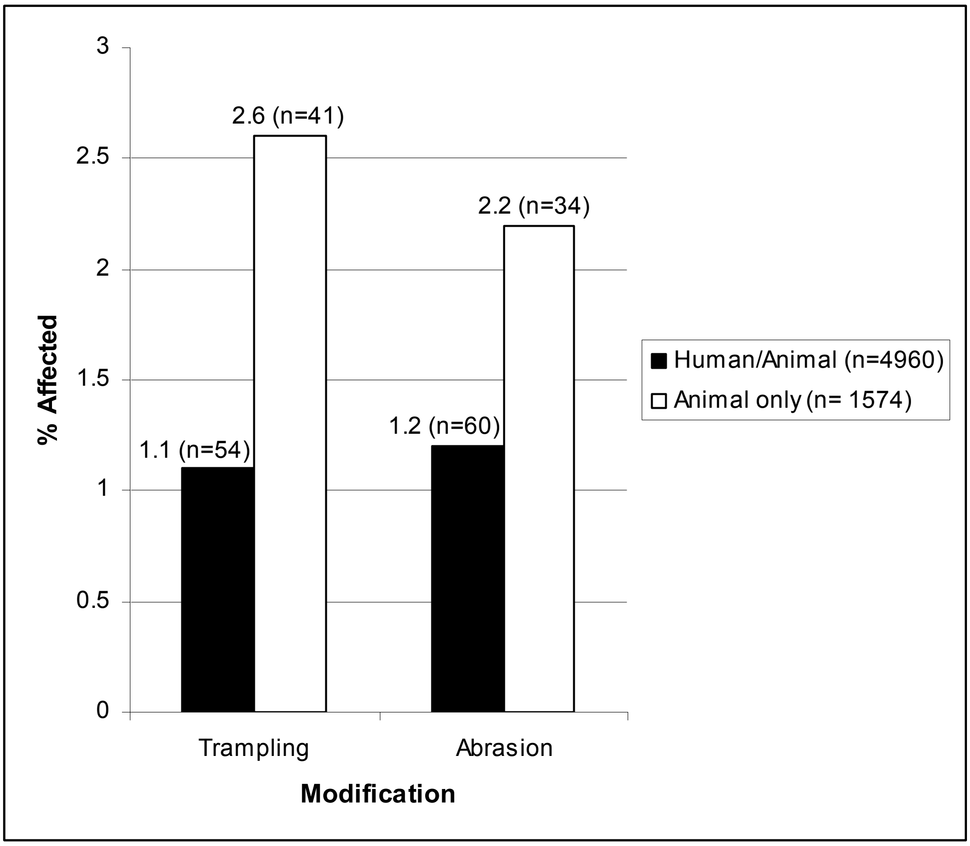

Figure 7.7 The percentage of animal bones from uniform features (those that contain only faunal remains) and mixed features (those that contain both human and faunal remains) that are affected by trampling and abrasion.

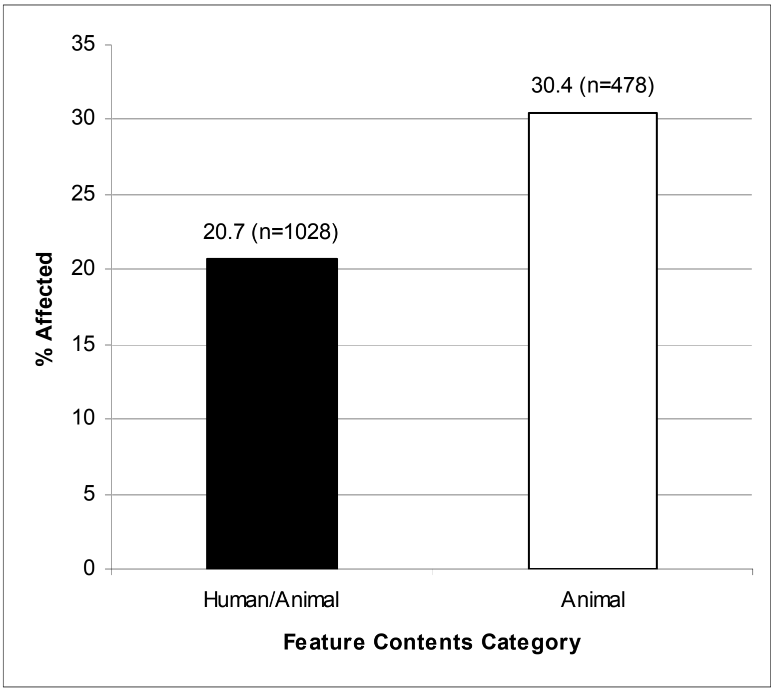

Figure 7.8 The percentage of animal bones from uniform features (those that contain only faunal remains) and mixed features (those that contain both human and faunal remains) that are affected by longitudinal and spiral fracturing. The sample of faunal fragments from mixed features comprised 4960 fragments with uniform features comprising 1574 fragments).

also revealed that dog and horse remains were treated significantly differently from other animals (Madgwick 2008).

Consequently a concentration of one species category (e.g. other animals) in mixed or uniform features could be responsible for the apparent difference in treatment. However, statistical testing revealed that the differences in bone modification in mixed and uniform features transcend species categories. Bones from uniform features exhibit greater evidence of weathering for dog/horse remains (T27, $p = 0.000$) and other animals (T28, $p = 0.000$). This remains the case when only including long bones in testing (T29, $p = 0.002$ for dog/horse, T30, $p = 0.007$ for other animals). Other modifications are also more prevalent in uniform features for each of the species categories. Gnawing (T31, $p = 0.000$ for dog/horse, T32, $p = 0.038$ for other animals), abrasion (T33, $p = 0.004$ for dog/horse, T34, $p = 0.035$ for other animals) and trampling (T35, $p = 0.001$ for dog/horse, T36, $p = 0.001$ for other animals) are all significantly more common in uniform features. Longitudinal/spiral fracturing reveals the same difference in dog/horse (T37, $p = 0.000$), although no difference was apparent for other animals (T38, $p = 0.591$). Therefore the contents of features has a clear effect on the modification of bones (at least for animals), with those from uniform features (those that contain only animal bone) exhibiting greater modification and therefore having been exposed to a significantly greater extent.

Discussion

Data analysis has revealed clear patterns in the taphonomic pathways of different classes of remains. The highly statistically significant results are indicative of prescribed practices in the pre-depositional treatment of skeletal material in Iron Age Wessex. The most striking finding is the differential treatment of disarticulated human and animal remains, with faunal material exhibiting significantly greater evidence of exposure in every instance. All possible sampling and taphonomic biases were systematically discounted from responsibility for this difference. Therefore it is clear that faunal remains were sub-aerially exposed to a significantly greater degree than human skeletal material. These findings emphatically refute the suggestion that human remains were indiscriminately disposed of in the Iron Age (e.g. Bersu 1940; Cunliffe 1991a, 505; Cunnington 1933) and demonstrate that specific considerations were given to the treatment of different classes of remains.

Initially these findings may be considered to suggest entirely unconnected practices in the treatment of the two classes of material, with only the feature in which they were deposited linking them. However, further analysis reveals more complex, inter-related modes of treatment. Results demonstrate that modification of animal bones is significantly more frequent when human remains are not found in association with them. As other factors that could be responsible for this difference have been discounted, evidence suggests a distinct practice whereby faunal remains deposited in features that contain humans, are exposed to a lesser degree. As statistical testing has demonstrated that humans display far less evidence of exposure, this can be viewed as faunal material being subjected to a mode of handling akin to that of the humans with which they are deposited and asserts that the two classes of remains are in fact inherently linked in their pre-depositional treatment.

The nature of the relationship of human and faunal remains may be bi-directional, with the association of animals affecting the way that humans are treated, just as the association of humans affects the way in which animals are treated. However, no analysis could be undertaken on features containing only human remains, as all those sampled comprised only articulated material. In spite of the quantity of bone fragments, Hill (1995, 54) has highlighted that it is, in fact, very rare for disarticulated human remains to be deposited without the association of faunal remains. This in itself provides interesting indications of how the association of faunal material affects the treatment of human remains. Bones from features containing only human remains exhibit the least evidence of exposure, as attested to by all remains being in at least a partially articulated state. The taphonomic analysis demonstrates that human material in mixed features provides greater evidence of exposure. Faunal remains from mixed features display even more modification and finally animal bones from features containing only animal material exhibit the greatest evidence of exposure.

The findings demonstrate that formalised modes of treatment relating to specific combinations of human and faunal material were employed in Iron Age Wessex. This indicates that neither class of remains was disposed of indiscriminately and that the bones of animals had far greater importance in society than mere waste material. These practices are suggestive of a society that prizes faunal species far beyond their value as domesticates, and whose relationship with animals runs far more deeply than that of consumer and consumed. This is demonstrated in the way that remains were not disposed of in the most effortless, convenient way, but rather time, consideration and energy was invested in the treatment of different classes of remains.

Analysis demonstrates that, in Iron Age Wessex, humans and animals were conceived of in fundamentally different ways, but not as entirely unconnected entities. Patterns in the treatment of remains suggest that symbolic relationships between humans and animals were deeply embedded in the fabric of society. Although there is a clear separation between humans and animals, for remains in mixed features, there is a degree of blurring of the boundary between human and animal identities, as indicated by the juxtaposition of modes of treatment. The conceptual proximity of humans and animals is demonstrated in the manner in which bones are treated in a similar way to the opposing class of remains when deposited in association. This might indicate recognition of a developed, almost human-like identity of animals. The symbolic importance of animals in Celtic life and ritual is well supported. Green (1992, 92) states that animals were of great importance as food, in hunting and in warfare and were of equal importance in death and religion in Iron Age society. The enhanced status of animals is alluded to in their prevalence in Celtic art (Green 1992). However, their social role in death is far more complex than previous suggestions of animal sacrifice (Grant 1984a; 1984b; Green 1992, 3; Holleyman 1937; Wait 1985, 153) or fertility rite relating to grain storage (Barrett 1989; Bradley 1981; 1984, 159; 1990, 183; Cunliffe 1983, 164; Cunliffe and Poole 1995), as specific modes of treatment are adhered to for all classes of remains from different features, not just those recovered from so-called ‘special’ deposits.

This research is concerned with the treatment of human and faunal remains between the death of individuals and incorporation into forming deposits and has demonstrated the close physical and conceptual relationship between humans and animals. It is highly plausible that this symbolic relationship would also be apparent in the treatment of animals during life. Production and consumption practices may also be permeated by rules and culturally prescribed behaviours that reflect the social value of domesticates that extends beyond meat, milk, wool, draught or hunting companion.

The aim of this paper is not to reveal the exact nature of social practices involving the pre-depositional treatment of different classes of remains. It is rather to reveal how a holistic taphonomic analysis of osseous material can contribute to our understanding of the perceptions of humans and animals within the communities of Iron Age Wessex. Human and faunal material was treated significantly differently within the sample and therefore remains were clearly distinguished and not subjected to homogeneous practices. However, the conceptual proximity of humans and animals is attested to by their closely related modes of treatment when deposited together. Without fine-grained taphonomic analysis, this relationship in pre-depositional treatment would remain unnoticed. Therefore in this age of a taphonomy-aware zooarchaeology, a greater focus on bone modification beyond the level of butchery and burning is required. Fleeting comments on the surface preservation of material have limited interpretative potential and consequently all modifications must be quantified in the same way as butchery and burning, as other taphonomic modifications are equally valid as interpretative tools. Processes such as weathering, abrasion, trampling and to a lesser extent gnawing have been marginalised in previous research, as they have often been regarded as incidental and not the product of human decision making. However just as cultural norms and values are reflected in production and consumption, so too are they in practices relating to deposition. Therefore these processes must become an integral part of the analysis and interpretation of faunal assemblages, in order to gain more complete biographies of skeletal material.

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Author's Affiliation

Richard Madgwick
School of History and Archaeology
Cardiff University
Humanities Building
Colum Drive
Cardiff
CF10 3EU
UK

Appendix

A key to the abbreviations used in the statistics table is presented below. The first entry in the description column in the table refers to the categories being tested for difference (e.g. H/A = humans and animals compared). Brackets denote the data selected for testing. For example (A) means only animals included in analysis and (A,LB) means only animal long bones included in the analysis. The final entry in the description refers to the variable being tested for difference (e.g. weathering, gnawing etc). In the direction of significance column, direction refers to which of the categories has a greater prevalence/severity of the variable in question, therefore H<A indicates that animal specimens have a greater prevalence (of e.g. weathering) than humans. All tests from T16 onwards were conducted on disarticulated material only.

* - continuity correction value used as values computed for a 2x2 table.
† - Fisher's exact test used, as more than 20% of boxes have expected values lower than 5.
A - Animal
ABR – Abrasion
ART – Articulation levels (compared)
ARTP – Articulation levels (proportions thereof)
CA – Features containing only animal specimens
CHA – Features containing human and animal specimens
CHI² - Chi² test
DF – Degrees of freedom
DH – Dog/Horse
DIS – Disarticulated
GNW – Gnawing stage (0-3)
H – Humans
LB – Long bones
LGCK- Longitudinal/Spiral fracturing
MWU – Mann Whitney test
OA – Animals other than dog or horse
TRMP - Trampling
WETH – Weathering stage (0-3)
WPA – Weathering (presence/absence)

Details of the statistical tests carried out ($p<0.05$). Refer to the key above for details of abbreviations and the use of the description column.

T	DESCRIPTION	TEST	N	CHI^2/MWU VALUE	DF	EXACT SIGNIFICANCE	DIRECTION
1	H/A - WETH	MWU	9493	8723752.000	3	**0.000**	H<A
2	H/A - GNAW	MWU	9493	9071550.000	3	**0.000**	H<A
3	H/A - ABR	CHI^2	9493	27.549*	1	**0.000**	H<A
4	H/A - TRMP	CHI^2	9493	36.140*	1	**0.000**	H<A
5	H/A - LGCK	CHI^2	9493	619.238*	1	**0.000**	H<A
6	H/A - ARTP	CHI^2	9493	2970.309	3	**0.000**	A<H
7	ART - WETH	MWU	9493	8723752.000	3	**0.000**	ARTC<DIS
8	ART - GNW	MWU	9493	5067975.500	3	**0.000**	ARTC<DIS
9	ART - ABR	CHI^2	9493	14.774*	1	**0.000**	ARTC<DIS
10	ART - TRMP	CHI^2	9493	14.292*	1	**0.000**	ARTC<DIS
11	ART - LGCK	CHI^2	9493	277.927*	1	**0.000**	ARTC<DIS
12	H/A (ARTC) - WETH	MWU	1292	35920.500	2	0.511	-
13	H/A (DIS) - WETH	MWU	8201	4962871.000	3	**0.000**	H<A
14	H/A (DIS, LB) - WETH	MWU	1215	80985.000	3	**0.000**	H<A
15	H/A (DIS) - GNW	MWU	8201	4962871.000	3	**0.000**	H<A
16	H/A (CHA) -WETH	MWU	6626	3806762.500	3	**0.000**	H<A
17	H/A (CHA) - GNW	MWU	6626	3947450.000	3	**0.000**	H<A
18	H/A (CHA) - ABR	CHI^2	6626	8.286	1	**0.004**	H<A
19	H/A (CHA) - TRMP	CHI^2	6626	253.044	1	**0.000**	H<A
20	H/A (CHA) - LGCK	CHI^2	6626	12.832	1	**0.000**	H<A
21	CHA/CA (A) - WETH	MWU	6534	3747217.500	3	**0.000**	CHA<CA
22	CHA/CA (A) - GNW	MWU	6534	3827572.500	3	**0.003**	CHA<CA
23	CHA/CA (A, LB) - WETH	MWU	1024	80985.000	3	**0.000**	CHA<CA
24	CHA/CA (A) - ABR	CHI^2	6534	6.956	1	**0.008**	CHA<CA
25	CHA/CA (A) - TRMP	CHI^2	6534	62.096	1	**0.000**	CHA<CA
26	CHA/CA (A) - LGCK	CHI^2	6534	18.125	1	**0.000**	CHA<CA
27	CHA/CA (DH) - WPA	CHI^2	695	22.244*	1	**0.000**	CHA<CA
28	CHA/CA (OA) - WETH	MWU	2166	344248.500	3	**0.000**	CHA<CA
29	CHA/CA (DH, LB) - WPA	CHI^2	139	9.284	1	**0.002**	CHA<CA
30	CHA/CA (OA, LB) - WETH	MWU	791	39806.500	3	**0.007**	CHA<CA
31	CHA/CA (DH) - GNW	MWU	695	25230.500	3	**0.000**	CHA<CA
32	CHA/CA (OA) - GNW	MWU	2166	361784.000	3	**0.038**	CHA<CA
33	CHA/A (DH) - ABR	CHI^2	695	9.023* †	1	**0.004**	CHA<CA
34	CHA/A (OA) - ABR	CHI^2	2166	4.450*	1	**0.035**	CHA<CA
35	CHA/A (DH) - TRMP	CHI^2	695	11.404* †	1	**0.001**	CHA<CA
36	CHA/A (OA) - TRMP	CHI^2	2166	10.100*	1	**0.001**	CHA<CA
37	CHA/A (DH) - LGCK	CHI^2	695	15.664*	1	**0.000**	CHA<CA
38	CHA/A (OA) - LGCK	CHI^2	2166	0.288*	1	0.591	-