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Cremated Bone in Archaeology: Ethical Considerations in the Excavation, Analysis, Storage, and Display of Cremated Bone in the United Kingdom

Kirsty Squires¹  | Jacqueline McKinley² | Charlotte A. Roberts³  | Trish Biers⁴ 

¹School of Health, Education, Policing and Sciences, University of Staffordshire, Stoke-on-Trent, UK | ²Wessex Archaeology, Salisbury, UK | ³Department of Archaeology, Durham University, Durham, UK | ⁴Duckworth Laboratory, Department of Archaeology, University of Cambridge, Cambridge, UK

Correspondence: Kirsty Squires (kirsty.squires@staffs.ac.uk)

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ABSTRACT

In the United Kingdom, the study of archaeological cremated human remains has risen exponentially over the past three decades. Consequently, we are gaining a more rounded understanding of past communities, rather than a skewed perspective caused by an overreliance on studies of human remains from inhumation graves. Yet, ethical considerations related to the excavation, recording, analysis, storage, and display of cremated remains are not explicitly explored in the literature. This paper redresses this imbalance and explores the key ethical challenges based on the authors' professional experiences in commercial archaeology, universities, and museums. Recommendations for best ethical practice are provided and are aimed at all relevant parties who may encounter cremated bone in their place of work. Clearly, best practice can only be achieved by ensuring practitioners (including students) have appropriate ethics training, including consulting with specialists where experience of cremated human bone may be lacking within a team. The attainment of standardized ethical protocols explicitly addressing cremated remains and implementing training initiatives should be spearheaded by professional bodies. Ultimately, we hope this paper will encourage the inclusion of cremated remains in ethical discourses within archaeology, osteoarchaeology, and museology.

1 | Introduction

Cremation was one of the most common mortuary rites undertaken in the prehistoric and early historic past. Some of the earliest evidence of cremation from the United Kingdom dates to the Mesolithic, and it was the predominant mortuary rite across several temporal spheres in many regions, that is, Middle Bronze Age (1600–1100 BCE), Late Iron Age (100 BCE–43 CE), early Romano-British (43–130 CE), and Early Anglo-Saxon periods (410–650 CE) (Kuijt, Quinn, and Cooney 2014; Thompson 2015a; Cerezo-Román, Wessman, and Williams 2017; Roberts 2018). Cremation subsequently became a minority rite and largely disappeared until the 19th century (Leaney 1989; Richards et al. 2004; Parsons 2005).

Currently in the United Kingdom, cremation is the preferred method of managing the dead, partly because it is cheaper and requires a smaller burial space than inhumation graves (Davies and Mates 2005; Rugg 2016; Woodthorpe et al. 2022; The Cremation Society 2023). The destructive nature of the cremation process—oxidation and dehydration of the organic components of the body, including bone—transforms the body to bone fragments and causes heat-induced changes which alters their appearance and integrity (Squires et al. 2011; Schmidt and Symes 2015; Thompson 2015a; Cerezo-Román, Wessman, and Williams 2017; Thompson et al. 2017; Carroll and Squires 2020a, 2020b). Consequently, some of the methods used to analyze these remains differ from those employed when studying unburnt bone.

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McKinley (1994a, 1) highlights that “[U]ntil fairly recently, archaeological cremations [*sic.* cremated remains] excavated in this country [UK] were largely ignored because it was thought no information could be gleaned from them”—a sentiment echoed in other countries (Roberts and Eklund 2006; Thompson 2015b; Williams 2015; Ubelaker and Shamlou 2023). In the past, archaeologists were mostly interested in the heat-altered and often incomplete artifacts recovered from deposits of cremated remains, though these objects were still not as valued as those from inhumation graves (McKinley 1994b)—this is thankfully starting to change (Crellin, Fowler, and Gamble 2020; Cooper et al. 2021). Similarly, osteoarchaeologists felt constrained by the incomplete and fragmentary nature of cremated bones and teeth. Heat modification inevitably limits some areas of analysis, for instance, documenting pathological lesions (Reinhard and Fink 1994; Lemmers 2012). Nevertheless, traditional osteological methods can be used to generate biological profiles of the cremated dead, provided sufficient skeletal elements survive to be studied, and can reveal information about the cremation process and associated mortuary rites (McKinley 2013, 2015a). Recent decades have also seen developments in both theory and methods (e.g., Olsen et al. 2013; Harvig et al. 2014; Squires, Booth, and Roberts 2019a), allowing researchers to gain greater insight into cremation practicing societies. Accordingly, the value and potential of cremated remains is becoming more widely recognized. The increasing amount of information that can be obtained from cremated remains (i.e., subject to that specific mortuary rite), and otherwise, burnt bone raises several ethical issues.

Despite the routine recovery of cremated remains from many archaeological contexts by commercial contractors or from research-led excavations, ethical considerations relating to excavation, handling, analysis, storage, and display of such heat-modified remains are rarely addressed in the literature, despite growing ethical awareness within osteoarchaeology¹ (Sayer 2010; Sellevold 2012; Squires, Errickson, and Márquez-Grant 2019a). This may be partly attributed to the fragmentary state of cremated remains; research has shown that relative completeness and preservation of bodies can influence how they are perceived by the living (Squires, Davidson, and Piombino-Mascoli 2024). The absence of identifiably human traits may lead some to diminish the value and importance of cremated bone; this was certainly an attitude held by archaeologists in the past (Myres 1973). Regardless, *all* human remains, from whatever temporal sphere or geographic location, should be treated with the respect deserving of a once living person.

The aim of this paper is to highlight specific ethical issues that relate to the excavation, analysis, storage, and display of cremated bone as a means of highlighting best practice. Throughout, cremated remains excavated from contexts in the United Kingdom will be the focus unless otherwise stated.² Recommendations are made, particularly where they have not been addressed elsewhere. The intention of these recommendations is threefold: (1) to encourage discourse around this subject between experts³; (2) to ensure that cremated and otherwise burnt remains are managed in an ethical manner; and (3) to highlight the benefits of adopting these recommendations. Each recommendation is either a “minimum acceptable standard” (i.e., the bare minimum that should be implemented) or a “recommended standard” (i.e.,

it would be beneficial to implement it) though in some cases, it is acknowledged that this may be impossible for a range of reasons, for example, a commercial organization not having an internal ethics committee or a museum not having an in-house osteoarchaeologist. Given that ethics and best practice are closely intertwined, we advise that this paper is read alongside best practice standards and guidelines which have addressed cremated remains (McKinley and Roberts 1993; IAI 2004; McKinley 2004, 2013, 2017a, 2017b; Roberts 2018).

2 | Codes of Ethics and Practice for Human Remains in the United Kingdom

Sellevold (2012, 141) defines ethics as “a philosophy or a system of morals” which is closely tied to what is “right” and “wrong” or “good” and “bad.” However, the application of a universal system of ethics (as per Kantian ethics) cannot be applied in osteoarchaeology due to differences in societal religious beliefs, cultures, and customs across the world throughout the course of time (Squires, Errickson, and Márquez-Grant 2019b). Therefore, when we consider ethics in osteoarchaeology, it is imperative that the context in which human remains were found is addressed; this will influence the ethical principles that guide a project. Ethical guidelines have been developed by archaeological and anthropological organizations that provide best practice for those interacting with human remains in their work (regardless of condition), though these do not cover all ethical challenges practitioners might face. Codes of practice have also been developed and implemented by these professional bodies. These documents are often influenced (to some degree) by governmental guidelines and legislation and are designed to ensure all practitioners conduct their work to the highest professional standards (Squires, Errickson, and Márquez-Grant 2019b).

Codes of ethics and practice are essential within osteoarchaeology to ensure human remains are treated with respect and dignity, from the time of their excavation through to their analysis, and potential storage, reburial, and display. However, guidance on ethics and practice related to osteoarchaeology per se were very slow to develop in the United Kingdom, where, until the early 2000s, there was relatively little discussion about how human remains should be treated from an ethical point of view (Roberts 2019). Many working in academia/commercial archaeology/museums prior to this time might not have reflected on the issue until ethical and good practice guidance had been developed and made available. One could argue that human remains were viewed and dealt with in the same way as other archaeological finds, but in the last two decades, greater emphasis has been placed on ethical practices for human remains in the United Kingdom (IAI 2004, 2006; DCMS 2005; Historic Scotland 2006; Advisory Panel on the Archaeology of Burials in England [APABE] 2013, 2017; Museums Association 2015; APABE and Historic England 2023). This includes the establishment of the APABE in 2005 and the publication of the British Association for Biological Anthropology and Osteoarchaeology’s (BABAO’s) Codes of Ethics and Practice in 2010 (BABAO 2019). These developments could be argued to have followed on from the passing of the Native American Graves Protection and Repatriation Act (NAGPRA) in North America (United States Code 3001–3013 1990; Rose, Green, and Green 1996; Lambert

and Walker 2018). Certainly, since the passing of NAGPRA in 1990, the treatment of colonial derived collections has prompted greater inclusion of, and discourse with, Indigenous Peoples about the study, care, and repatriation of human remains (Regan 2006). More recently, as the United Kingdom reflects on its colonial legacy—including collecting human remains across the world and their transport back to the United Kingdom into museums and other institutions (Stahn 2023)—ethical considerations are very much at the forefront of management practices of those remains (Pitt Rivers Museum n.d.; Fletcher, Antoine, and Hill 2014; Morton 2020; Duckworth Laboratory 2022). Yet, while strides are being made to ensure work with human remains is approached in an ethical manner, cremated bone is all too often overlooked in project outputs. This is problematic and needs addressing given the large number of cremated bone deposits currently being excavated from archaeological sites and stored in museums across the country.

3 | Standards and Guidance for Archaeological Cremated Bone

Standards and guidelines published by the Chartered Institute for Archaeologists (CIfA; McKinley and Roberts 1993; McKinley 2004, 2017a) and the APABE and Historic England (2023) have outlined how human remains, including cremated bone, should be excavated, analyzed, and recorded, but they have not considered the ethical implications of such work. The Code of Ethics produced by the BABAO (2019) does not tackle this subject matter either. Similar situations have been identified in ethics related documents in the United Kingdom and elsewhere (WAC 1990; AAPA 2003; DCMS 2005; Cassman, Odegaard, and Powell 2006; Giesen 2013; ICM 2017). While it could be argued that standard ethical principles and guidelines are relevant to *all* archaeological human remains regardless of preservational state, taphonomically altered bodies are intrinsically tied to additional ethical considerations and requirements that are not applicable to the excavation, analysis, storage, and display of complete skeletons from inhumation graves, a point also raised by Sellevold (2012). This is evident in mummy studies with its growing body of literature that tackles the unique ethical requisites associated with mummified remains (Piombino-Mascoli and Gill-Frerking 2019; Gill-Frerking 2020; Squires and Piombino-Mascoli 2021; Piombino-Mascoli, Squires, and Zink 2024; Piombino-Mascoli et al. 2024). In the case of cremated remains, there are fundamental differences in completeness, relative fragmentation, and importantly, the amount of information that can be recorded. This can be lost if ethics are not reflected upon by the archaeological excavators, osteoarchaeologists undertaking analyses and reporting, museum curators responsible for storage and display, and researchers accessing the subsequently curated material. Clearly, greater acknowledgement and awareness of the ethical challenges posed by cremated human bone are required given the wide range of interested parties⁴ that our work affects, particularly where the remains originated from countries overseas and are currently housed in UK institutions.⁵

4 | Excavation and Initial Processing

The majority of cremated and unburnt human remains excavated in the United Kingdom since the introduction of Planning

Policy Guidance 16 (PPG16) in 1990 have been recovered by commercial archaeological contractors from excavations undertaken in advance of construction works (PPG16: Archaeology and Planning 1990). A failure to undertake such investigations would result in the unrecorded destruction of a variety of mortuary-related contexts and the loss of valuable archaeological data. A Ministry of Justice license is required for the removal or disturbance of human remains, irrespective of their date of deposition, state (burnt or unburnt), condition, or quantity (McKinley and Roberts 1993). A standard condition of the license is that the aforementioned “... shall be effected with due care and attention to decency ...” (Plantagenet Alliance Ltd v. The Secretary of State for Justice and Others 2014, 11). However, just because cremated bone is not readily identifiable as human does not mean it should not be treated with the same level of care and consideration as that which is more obviously so (Figure 1). Furthermore, from a legal perspective no distinction is made between burnt and unburnt human remains (Burial Act 1857; Disused Burial Grounds [Amendment] Act 1981; Human Tissue Act 2004; Human Tissue [Scotland] Act 2006).

Inappropriate excavation procedures can be highly detrimental both to the bone itself and to our ability to interpret and

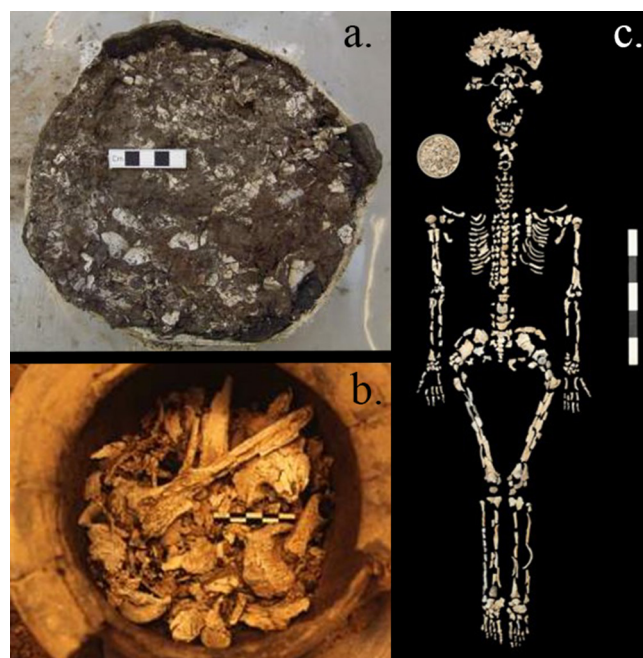


FIGURE 1 | Preservational differences between cremated bone deposits. (a) Poor bone preservation due to infiltration of the acidic silty clay soil matrix in a Romano-British urn from Kent (J. I. McKinley); (b) good preservation resulting from the survival of a lid/cover which protected remains from the surrounding soil (J. I. McKinley). This Romano-British cremated bone deposit (H181) from Bestwall Quarry (Dorset) contained 599.6 g of burnt material. Osteological analysis revealed the urn housed the remains of a 30- to 45-year-old female (McKinley 2009); and (c) excellent preservation allowing bone to be laid-out in anatomical order (Wessex Archaeology). These cremated remains were excavated from an Early Bronze Age burial (1/52) from Amesbury Down (Wiltshire) and yielded 1758.9 g of bone; osteological analysis revealed the individual was a 16- to 17-year-old female (McKinley 2015c). [Colour figure can be viewed at [wileyonlinelibrary.com](https://onlinelibrary.wiley.com)]

understand formation processes which relate to stages of this mortuary rite. The most ethical way in which we can recover cremated remains in the first instance is to minimize damage during excavation. In the United Kingdom, most features containing cremated remains survive to less than 0.25 m in depth below the level of an archaeological stripped surface. Thus, during machine stripping of a site, the archaeologist watching the machine needs to be alert to the potential presence of these features, particularly as the altered state of cremated remains (fragmentary, incomplete, and of variable color) renders them less readily recognizable to the non-specialist than those of unburnt bone (Figure 1). Many archaeological contractors issue their own excavation guidance, though published guidelines are also available (McKinley 2000, 2013, 2017b; Arcini 2005; Duday 2009). Where an excavator is uncertain of the most appropriate recovery method for a specific deposit, it is imperative they engage with an experienced osteoarchaeologist who can advise on best practice. It could be argued that a failure to ensure an appropriately high standard professional job is undertaken due to the lack of training or consultation with specialists not only results in the loss of vital data (Rainwater et al. 2012) but is also unethical.

Interpretation of cremation-related deposits cannot necessarily be undertaken in the field as it requires a carefully considered coordination of the contextual and osteological data (McKinley 2013, 2015b). For example, computerized tomography (CT) of block-lifted urned burial remains may be performed to assist in understanding depositional sequences and formation processes (Figure 2; McKinley 2015d; Higgins et al. 2020; McKinley and Daniel 2021). Therefore, it is both a professional

and ethical responsibility of the excavator to thoroughly record and recover all the archaeological components (bone, pyre and grave goods, and fuel ash) on site and during the microexcavation of block-lifted urns. Professional organizations (e.g., CIFA and associated special interest groups [SIGs]) could drive forward this change by updating their codes of conduct and stipulating the need for specialist consultation, as circumstances require (e.g., CIFA 2014). These guidelines should be disseminated to managers working within commercial archaeology who can then implement best practice within their own companies (Table 1).

Universities and other educational providers—in archaeology and osteoarchaeology—have a responsibility to teach recording and interpretation skills so, by the time graduates enter the workforce they understand the minimum requirements for recording archaeological features and deposits, including those containing cremated human remains (Everill 2015; Derudas and Berggren 2021). Although practical excavation experience with mortuary deposits might not be possible, students should be taught the theory that underpins practice in the field, together with the ethical challenges faced by osteoarchaeologists (in a commercial archaeology, research excavation, or field school context). Unfortunately, master's courses in osteoarchaeology devote very little time to the subject of cremated bone and associated excavation, analysis, and recording procedures. Thus, due to limited experience, graduates will be less confident when faced with these types of remains in the field. Caffell and Jakob (2019) have highlighted the value of using cremated human remains in teaching as it improves anatomical knowledge and identification skills which, in turn, makes for better

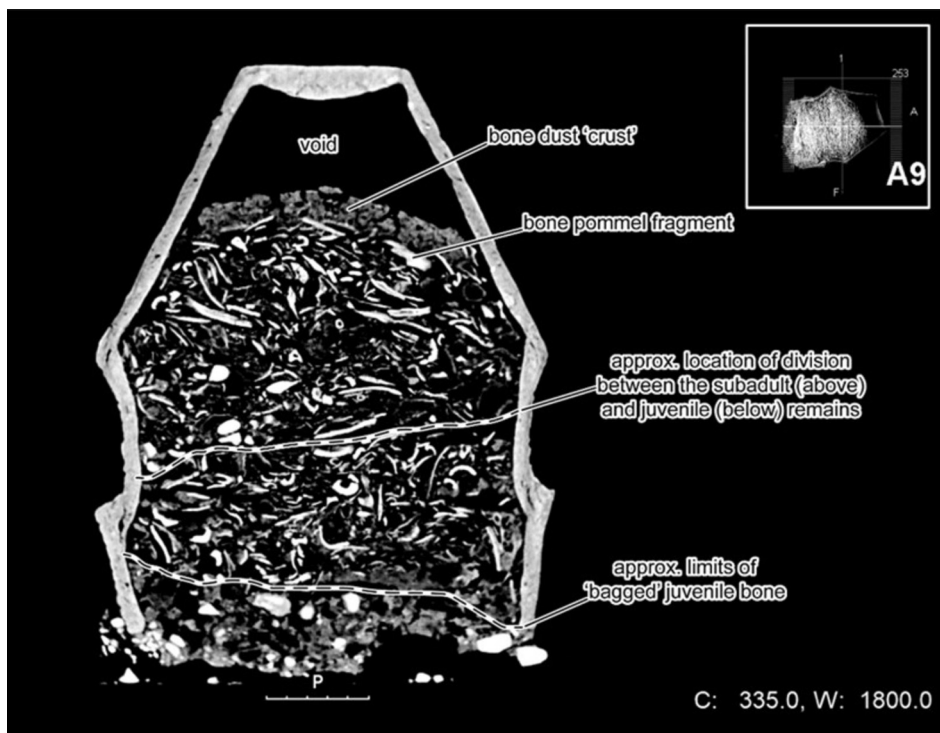


FIGURE 2 | CT scan of Early Bronze Age urned burial remains in an inverted vessel showing division of bone fragments from two cremations (Wessex Archaeology). This urn (1167) was excavated from Doveridge (Derbyshire) and contained 1781.9 g of burned material. The remains of three individuals were identified in this vessel and included (1) a 13- to 17-year-old (subadult) probable female, (2) a 7- to 12-year-old (juvenile), and (3) a 1- to 3-year-old (infant) (Daniel, McKinley, and Brown 2022).

TABLE 1 | Recommendations for best ethical practice in excavation and initial processing and their anticipated benefits.

Recommendation	Minimum acceptable standards/recommended standards	Anticipated benefit
Project managers should ensure that experienced osteoarchaeologists are available to advise on the excavation and recording of contexts containing cremated remains. The Cifa (including the Human Osteoarchaeology SIG) would be best placed to prompt this change by updating their codes of conduct, stipulating the need for specialist consultation when cremated remains are found (e.g., Cifa 2014) as this will ensure appropriate ethical guidelines are followed.	Minimum acceptable standards	<ul style="list-style-type: none"> • Damage to archaeological remains will be minimized • Maximum amount of information will be obtained from archaeological contexts • Greater ethical awareness • Staff will develop their knowledge and excavation skills
Practitioners should adhere to all professional guidance, relevant ethical guidelines, and legal requirements when cremated remains are found on archaeological sites. This applies to their identification in the ground through to excavation, recording, and packing.	Minimum acceptable standards	<ul style="list-style-type: none"> • Improved professional practice • Greater ethical awareness
The use of non-invasive imaging techniques (e.g., CT scanning) can aid osteoarchaeologists in the microexcavation of urns. Therefore, partnerships with hospitals, mortuaries, museums with specialist equipment, and private providers (CIRAM 2024) can be beneficial to archaeological projects. While hospital radiology departments may encourage the use of their facilities, we must consider the ethics and practicalities of using hospital services (Roberts 2018, 110).	Recommended standards	<ul style="list-style-type: none"> • Long-term preservation of collections • More accurate excavation and documentation of unexcavated vessels
Postgraduate osteoarchaeology programs would benefit from placing greater emphasis on the ethical challenges associated with the excavation, on-site recording, postexcavation analysis, and interpretation of cremated human remains from different types of archaeological site and contexts.	Minimum acceptable standards	<ul style="list-style-type: none"> • Greater ethical awareness • Instilling ethics from the outset of courses will promote good practice for future generations
Professional bodies (e.g., Cifa) should consider incorporating the knowledge and skill set required to excavate, analyze, and interpret deposits of cremated remains into competence standard matrices (e.g., Cifa (Human Osteoarchaeology SIG) 2016) and the introduction of standards for training on postgraduate courses, which universities should refer to when developing curricula.	Minimum acceptable standards	<ul style="list-style-type: none"> • Greater ethical awareness • Instilling ethics from the outset of courses will promote good practice for future generations

qualified and capable osteoarchaeologists. Thus, to instill confidence in early career osteoarchaeologists, the incorporation of cremated remains should form a core component of postgraduate taught curricula (Table 1).

5 | Analysis

When human remains are transferred to the laboratory for analysis, ethical principles should continue to be applied and

adhered to. Some of the methods adopted to further improve our understanding of the cremation process (e.g., histomorphometry) and identity of the deceased (e.g., isotope analysis) require destructive sampling (Harvig et al. 2014; Snoeck et al. 2016; Thompson et al. 2016; Cambra-Moo et al. 2018; Carroll and Squires 2020a, 2020b). This has become an area of contention requiring sound justification for sampling. Furthermore, the selection of appropriate methods should be in place from the outset of a project to avoid unnecessary destruction of skeletal remains (Squires, Booth, and Roberts 2019). Although cremated bones and teeth are fragmentary, this does not necessarily justify sampling; they are not infinite resources and will be depleted if not carefully managed (Pálsdóttir et al. 2019; Squires, Booth, and Roberts 2019). This could result in the loss of information for future generations of scholars, who will undoubtedly have access to more refined and advanced methods than are currently available. When selecting samples researchers should be mindful of the size of individual bone deposits, the number of different skeletal elements within a site assemblage, and the presence of duplicate bones from a single context. For example, the petrous portion of the temporal bone is used for stable isotope analysis (Harvig et al. 2014; Veselka et al. 2021). This is problematic as these elements are extremely valuable in cremated bone analysis, for example, when estimating the minimum number of individuals. It is thus essential that researchers do not deplete assemblages of favored skeletal elements for the purpose of a single study (Clough 2020).

Repeatability is of great importance in science as it allows practitioners to accurately replicate studies and directly compare results with previous analyses. However, where key information is missing from reports or publications, for example, the specific skeletal elements sampled in a study, this is not possible. In osteoarchaeological publications, unique reference numbers (URNs; e.g., context, burial, and skeleton numbers) and/or skeletal elements used in analyses are not always included, while in other cases, non-specific information is provided, for example, “skull” or “diaphysis” of a long bone are noted as the bones sampled (e.g., Snoeck et al. 2016, 2018, 2020; Draily et al. 2021). A lack of transparency makes it increasingly challenging for researchers to establish which bones can be useful for different types of analysis and which skeletal elements have been taken (and potentially destroyed) for the purpose of a study. These projects are typically multidisciplinary and often involve personnel who should be aware of the value of including URNs and sample details in reports and publications. Enhanced reporting requirements by publishers and greater emphasis on transparency in reporting results at a university level—and training in the field—could directly address this issue in the future.

Many published studies that have conducted destructive sampling of cremated bone do not stipulate that ethical approval was sought from home institutions via internal ethical review, curating organizations, and/or funding bodies. Acknowledgement that ethical approval was obtained for a study (e.g., Carroll and Squires 2020a, 2020b) demonstrates that the research proposal has been reviewed by an independent panel, the rationale for the research is appropriate (e.g., driven by focused research questions), and the methods are suitable and ethically sound.

In cases where there is no ethics committee/panel in place, ethical guidelines should be adhered to and cited in associated reports and publications (Spiros, Plemons, and Biggs 2022; Squires, Roberts, and Márquez-Grant 2022). However, there could be various reasons for the exclusion of this information from publications. Firstly, when working with cremated human remains in the United Kingdom that are over 100 years old, it may be deemed unnecessary to seek ethical approval for research as it falls outside the remit of the Human Tissue Act (2004). Likewise, given the chronological age of remains, it is unlikely that the deceased would have traceable/living family members and is thus not seen as an ethical issue. Secondly, researchers may have been granted permission to study cremated remains by a curating institution without the need to obtain ethical approval for their study. Thirdly, there may be no requirement for practitioners or researchers to complete an ethics approval process at their home institution when analyzing (and sampling) archaeological bone. One way to make this more uniform across the sector is for organizations in the United Kingdom (e.g., BABAO and CIFA) to add a formal process to their guidelines (Table 2). This would mean that members of these entities or those working for accredited organizations would be required to follow their own ethical guidelines and/or those provided in this article.

6 | Storage and Curation

Using appropriate storage containers that protect cremated bones and teeth, limiting environmental impacts, and ensuring long-term preservation of assemblages and the use of detailed catalogs are all essential in curating burnt human remains. Across institutional collections in the United Kingdom, there are fewer holdings of cremated remains than skeletons from inhumation burials. This in part can be attributed to the negative attitudes traditionally held towards cremated remains in the United Kingdom meaning they were typically overlooked in their curation (Myres 1973; McKinley 1994a; Williams 2015).⁶

The quantity of cremated bone yielded from archaeological deposits in the United Kingdom varies greatly from less than one gram to several kilograms (McKinley 1993). In the case of deposits that produce large quantities of cremated bone, bags of remains may be split between two boxes and stored together (Regan 2006; SMA 2020). However, given the current national storage crisis (Baxter 2023), whether it is realistic and possible to store several boxes of cremated bone from individual deposits together is debatable. The ever-increasing use of destructive sampling also raises ethical challenges in the storage, curation, and access to assemblages of cremated remains. Discourse with curating organizations is essential, particularly when selecting the most appropriate samples for a study (i.e., only taking samples from deposits where the antimer is present, avoiding “diagnostic” areas, and remains with taphonomic and palaeopathological modifications; Squires, Booth, and Roberts 2019; Clough 2020) and foreseeing ethical challenges associated with heat-modified archaeological assemblages. This includes assuring that a study is subject to an ethical approval process, a formal agreement that any remnant samples will be returned to the curatorial

TABLE 2 | Recommendations for best ethical practice during the analysis of cremated human remains and their anticipated benefits.

Recommendation	Minimum acceptable standards/ recommended standards	Anticipated benefit
Greater transparency pertaining to the URNS of cremated bone deposits and the bones sampled for analysis in publications is needed; publication in open access format would be an important step in overcoming this challenge. Costs associated with open access publication should be factored into tenders and funding applications if these are not covered by the researcher's home institution.	Recommended standards	<ul style="list-style-type: none"> • Greater transparency improves accountability for our work • Open access outputs ensure studies are available to all interested parties
Ethical approval to conduct research should be sought from the appropriate curating institution, for example, commercial archaeology contractors, universities, independent laboratories, and museums.	Minimum acceptable standards	<ul style="list-style-type: none"> • Greater ethical awareness • Improved professional practice
Professional bodies (including BABAO and ClfA) to integrate a formal ethics process to its guidelines for members and those working for accredited organizations.	Recommended standards	<ul style="list-style-type: none"> • Greater ethical awareness • Improved professional practice
Research questions for both preliminary studies and larger projects should be scientifically justifiable and focused, as opposed to exploratory studies, ^a with considerations given to feasibility and awareness of results from any previous studies.	Recommended standards	<ul style="list-style-type: none"> • Greater ethical awareness • Improved professional practice • Long-term preservation of collections
Proposals should outline the method(s) researchers plan to use in their work, their research question(s), evidence of institutional ethical approval (i.e., commercial archaeology contractors, university, or museum), and a justification for using the proposed technique(s)/methodology.	Minimum acceptable standards	<ul style="list-style-type: none"> • Greater ethical awareness • Greater transparency improves accountability for our work • Improved professional practice • Long-term preservation of collections
When samples are taken, details including the date they were taken, by whom (and their associated institution) and for what purpose should be logged in a database ^b along with written details of sampling placed in the bags of remains sampled; this ensures future researchers can see when collections have been sampled. A pre-sampling photographic record is also recommended for archival information.	Minimum acceptable standards	<ul style="list-style-type: none"> • Curatorial best practice for assemblages containing human remains • Greater ethical awareness • Greater transparency improves accountability for our work • Improved professional practice • Long-term preservation of collections
It is recommended that an ethics statement and details of ethical approval of a project are included in reports and publications ^c (Squires, Roberts, and Márquez-Grant 2022). It is imperative that osteoarchaeologists are able to demonstrate ethical awareness in the work they conduct.	Minimum acceptable standards	<ul style="list-style-type: none"> • Greater ethical awareness • Greater transparency improves accountability for our work • Improved professional practice

^aIt is important to highlight that exploratory studies are very occasionally necessary. However, these should be exceptional, held to an extremely high standard of rigor, and involve the minimum possible sample size.

^bA data management plan should be implemented from the outset of a project and may be influenced by the author's home institutional research data management policy. Databases should be shared with the relevant curating institution(s) and published in an open access format (e.g., on the Archaeology Data Service) where possible.

^cSome journals now require ethics statements when submitting manuscripts, for example, American Journal of Biological Anthropology (2022) and International Journal of Osteoarchaeology (2024).

body/institution of origin following analyses and not passed to other laboratories, and any publications resulting from the research are published in open access format (which is now typically required for funded research projects) and are shared directly with curators. To complicate matters further, residues from remains subjected to destructive sampling demand

specific storage facilities. For example, extracted collagen is best stored in a stable environment (0°C–5°C refrigerated or –80°C for long-term aDNA preservation) (SMA 2020). Not all institutions have access to specialist storage facilities; they are expensive and take up large amounts of space, further highlighting the peripheral issues with excessive destructive

TABLE 3 | Recommendations for best ethical practice in storage and curation and their anticipated benefits.

Recommendation	Minimum acceptable standards/ recommended standards	Anticipated benefit
Research proposals should be submitted to curating bodies before researchers are granted access to cremated remains for sampling. This will limit the number of skeletal elements sampled for a single study and will ensure assemblages do not become depleted.	Minimum acceptable standards	<ul style="list-style-type: none"> • Long-term preservation of collections
Curating institutions need to understand what information researchers should be providing when they receive requests to study and/or sample cremated bone assemblages. They should keep up to date with current best practice and know when to allow sampling (and when not to) or—especially if they have no in-house osteoarchaeologist—ensure they have access to an appropriately qualified advisory organization or individual with whom they can consult, for example, BABAO, CIfA, and Museums Association.	Minimum acceptable standards	<ul style="list-style-type: none"> • Greater ethical awareness • Long-term preservation of collections
At the beginning of a project, researchers should consider specialist storage requirements for any remnant samples they may have following analyses. This will ensure the relevant curating institution is able to accommodate these remains or whether the researchers will need to factor in the cost of long-term preservation of samples into a funding bid.	Minimum acceptable standards	<ul style="list-style-type: none"> • Long-term preservation of collections
All remnant samples from cremated bone for the purpose of biomolecular and histomorphological analyses should be returned to the curating institution following analysis and stored alongside the original deposits of cremated bone, with documents describing the outcomes of all analyses carried out.	Minimum acceptable standards	<ul style="list-style-type: none"> • Curatorial best practice for assemblages containing human remains
In cases where cremated remains have been excavated by quadrant and spit, they should not be recombined into a single bag for storage. Instead, each spit should be bagged by quadrant.	Minimum acceptable standards	<ul style="list-style-type: none"> • Curatorial best practice for assemblages containing human remains • Long-term preservation of collections
Curating institutions should keep detailed records of access to collections and for what purpose, with dates of visits, details of sampling methods and work carried out, with project end dates and terms and conditions of the use of collections. These data should be stored on a central institutional database as opposed to personal work storage spaces as this will ensure the digital archive is not lost when personnel leave their posts.	Minimum acceptable standards	<ul style="list-style-type: none"> • Improved record keeping of cremation-related archives • Long-term preservation of collections

TABLE 4 | A range of display methods can be used to effectively convey information about the excavation, recording, and analysis of cremated remains as well as cremation practices in the past. The benefits and drawbacks of each approach should be considered prior to displaying these types of remains.

Display method	Benefits	Drawbacks
Non-invasive imaging, for example, 3D photogrammetry and CT scanning (Figure 2)	<ul style="list-style-type: none"> • Noninvasive • Allows visitors to see inside an unexcavated vessel • Ability to highlight bones and objects using different colors to show deposition patterns • Ability to visualize the use of quadrants to recover and record data; this shows how archaeologists distinguish and map the different layers and contents within a vessel • Can be interactive 	<ul style="list-style-type: none"> • Vessels already held in collections may have been excavated, thus making this approach redundant • Access to equipment and costs associated with CT scanning can be prohibitive • Not possible to obtain consent from the deceased to display scans of their remains in a public forum
Illustrative text	<ul style="list-style-type: none"> • Enhance visitor understanding about the mechanisms associated with pyre construction and processing of the body • Convey how osteoarchaeologists identify and analyze cremated remains • Show how cremated human remains can be used to learn about the cremation process itself and associated mortuary practices 	<ul style="list-style-type: none"> • Not interactive • Good quality photographs or artwork needed for an effective display
Labeled examples of the same skeletal elements from cremation deposits and inhumation graves	<ul style="list-style-type: none"> • Clear visualization of how cremated bone can be identified and the information it can yield • Quashes misconceptions. This approach offers the opportunity to show that bone does not turn to “ash” after burning • Showing identifiable elements, serves as a reminder that these remains need to be handled, stored, and displayed in an ethical manner 	<ul style="list-style-type: none"> • Due to the fragmentary nature of cremated remains, it may be difficult to find burned bones and their unburned equivalents • Removing skeletal elements for the purpose of display means splitting up a deposit, which could be classed as unethical practice (e.g., Regan 2006)

TABLE 5 | Recommendations for best ethical practice when displaying cremated remains and their anticipated benefits.

Recommendation	Minimum acceptable standards/ recommended standards	Anticipated benefit
Just as with other human remains on display, signposting to gallery visitors, for example, in a museum, should be in place to warn visitors should they not want to see human bones.	Minimum acceptable standards	<ul style="list-style-type: none"> • Improved visitor experience
If cremated bone is to be displayed, it is critical to not destroy evidence of the formation process recorded during excavation. Care must be taken to highlight the bone fragments in a way that protects but still portrays them in an authentic way, such as an emphasis on primary (cremation) and secondary (burial) processes of this mortuary rite.	Minimum acceptable standards	<ul style="list-style-type: none"> • Improved visitor understanding of archaeological cremation • Long-term preservation of collections
Text panels can benefit from 3D photogrammetry and CT scanning imagery to show the external details of cinerary urns as well as inside the vessel which, in turn, can show how deposits containing cremated remains do not always represent the amount of bone expected from a complete human body.	Recommended standards	<ul style="list-style-type: none"> • Improved visitor understanding of archaeological cremation
An experienced osteoarchaeologist should be asked for feedback on the content and any ethical concerns when displaying cremated remains.	Minimum acceptable standards	<ul style="list-style-type: none"> • Cremated remains are put in context, making for a more ethically sound display • Improved visitor understanding of archaeological cremation • Improved visitor experience • Specialist knowledge can be used to improve curators and museum workers knowledge and understanding of cremated remains and the cremation process

sampling and failure to consider the afterlife of remnant samples from the outset of a project (Table 3).

7 | Display

Museums play an important role in introducing broad audiences to the complexities of mortuary archaeology, including management and treatment of the deceased individuals, and helping visitors process the reality of death and how the dead can be transformed into something else entirely (Biers 2019). This can be achieved by incorporating human remains, or parts thereof, into museum displays. There has recently been significant debate about whether human remains should be displayed to the public as they are often cited as continual actors in discourse surrounding the displacement of people, ethics and consent, and problematic colonial collecting (Hallam 2016; Lamptey 2022; McKie 2022). In particular, the display of certain types of remains (e.g., wet samples of body parts, mummies, and non-adult remains) has been criticized (Biers 2019; Squires and Piombino-Mascoli 2021; Squires, Davidson, and Piombino-Mascoli 2024). Cremated remains are considered

to have less of an impact on museum visitors than unburnt skeletal or mummified remains (Williams 2016). This is noteworthy given that despite the altered outward appearance and internal biological structure, these remains still represent the physical presence of the deceased (Williams 2016; Biers 2019). DCMS (2005, 20) guidelines state that the display of human remains should provide “a material contribution to a particular interpretation.” Yet, frequently, there is limited context or discussion about cremated human remains when on display, which is a missed opportunity for humanizing the dead and informing the public about this funerary rite.⁷ A shift in ethical protocols when displaying cremated remains, akin to those that apply to the display of complete skeletons and mummies (e.g., signage warning visitors of the display of human remains) (Bonney, Bekvalac, and Phillips 2019) is perhaps needed to change the way they are perceived by the public.

The display of archaeological cremated remains has the potential to teach the public about a specific type of mortuary treatment that is familiar and slightly shrouded in mystery. For example, this work can reveal why archaeological and modern cremated remains look different, how osteoarchaeologists microexcavate

cremated remains from vessels, and what pyre goods can inform us about a cultural group. Stylistic decisions around the presentation of cremated remains in exhibitions can play an integral role in effectively communicating information about identifying the dead, the cremation process, and practical and ethical challenges encountered by archaeologists and osteoarchaeologists (Tables 4 and 5).

8 | Limitations

The dearth of published work that explicitly addresses the ethical treatment of cremated remains was the primary limitation of this study. Most osteoarchaeological research focuses on unburnt skeletal remains, and consequently, cremated bone makes its way into fewer publications and conference presentations (Carroll and Squires 2020b; Lippok 2020; Brandsen and Lippok 2021). This may be partly due to lack of experience or training opportunities to develop the skills needed in the excavation, analysis, and interpretation of archaeological cremated remains, or the perception that working this material requires great patience due to its fragmentary and incomplete nature. As a result, cremation is not explicitly addressed and is therefore more invisible to the readership, which ultimately has an impact on wider ethical discussions within osteoarchaeology.

While the current paper does not delve into the perceptions and attitudes of all practitioners who may interact with archaeological heat-modified human remains or those of museum visitors, this is something that will be explored by the authors at a later date. A questionnaire aimed at UK-based professionals who interact with archaeological cremated bone, and a version tailored for the public, will be created and disseminated with the intention of establishing how ethical views are affected by professions, religious beliefs, cultural backgrounds, and regions in which the participants live and improving ethical awareness and practice when interacting with heat-modified remains from archaeological contexts in the United Kingdom.

9 | Summary

Over the past 30 years, there has been increased interest in archaeological cremated human remains, from their excavation through to their analysis and subsequent curation and display. Even though sophisticated analytical techniques are now being used to better understand the demographic attributes of cremation practicing groups, and their identities and mortuary customs, ethical approaches to the way we study these remains have been overlooked. This is in stark contrast to the large bodies of literature that now focus on the ethical treatment of unburnt remains and other forms of taphonomically altered bodies. It is important to reiterate that despite the fragmentary nature of cremated remains and the near absence of characteristics that often make them recognizably human to the untrained eye, awareness of ethical issues is needed throughout the lifecycle of a project.

Change starts from the top, and we need leaders in the commercial archaeology sector to ensure staff are properly trained and refer to specialists when cremated bone deposits are found, particularly if those on site have limited experience of excavating/

analyzing these types of remains. This could be achieved by regularly engaging with Continuing Professional Development courses to ensure they are passing on up-to-date knowledge and skills to their employees. In the United Kingdom, the BABAO, APABE, CifA (and its Human Osteoarchaeology SIG), and the recently formed CreMATE Network (UK Research and Innovation 2024) may be able to drive these changes. Likewise, when it comes to analysis (particularly where sampling is being undertaken), it is important that curating bodies and journal editors request evidence that authors are practicing ethically in their research, for example, obtaining ethical approval to conduct destructive sampling from their employer (commercial archaeology company/university/museum) and the relevant curating institution. In universities, relevant and appropriate education at all levels, from undergraduate to PhD and for academic and technical staff, would highlight the importance of cremated remains and ensure ethically relevant treatment in teaching and research. Finally, in museums where there is often a lack of specialists who are familiar with human remains, staff should be able to contact organizations (e.g., BABAO, APABE, and CifA) for guidance and advice, calling upon these unique networks of professionals who subscribe to standardized ethical protocols. Change is happening for the better when it comes to ethics in osteoarchaeology but let us not neglect cremated remains.

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Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

Data sharing is not applicable to this article as no new data were created or analyzed in this study.

Endnotes

¹This is evident by the lack of discourse around archaeological cremated remains and ethics within both archaeology and osteoarchaeology (Cassman, Odegaard, and Powell 2006; Sayer 2010; Giesen 2013; McKinley 2015b; Thompson 2015b; Williams 2015; Roberts 2018; Squires, Errickson, and Márquez-Grant 2019a, 2019b; Squires 2024).

²The authors recognize that outside of the United Kingdom, archaeology and osteoarchaeology may function very differently for many reasons (e.g., related to historical development, number of people working in the field, resources and training available, and collaboration with Indigenous and/or religious groups), which consequently affects ethical challenges faced by practitioners.

³In this case, experts refer to any professional involved in the handling of cremated bone deposits, for example, archaeologists, osteoarchaeologists, curators of skeletal remains in museums and other institutions (i.e., universities), other museum employees, and technicians involved in destructive sampling.

⁴Interested parties include (but are not limited to): Indigenous and religious groups, descendants of the dead, higher education institutions, funding bodies, the wider scientific community, and visitors to museums and heritage sites.

⁵British expeditions and field projects in the nineteenth and twentieth centuries filled museum stores and university departments with objects and human remains from other countries. For example, the Duckworth Laboratory at the University of Cambridge has cremated bone and ash from non-European countries. There is very little documentation about these collections, bar the basic descriptions on the original glass vial labels (e.g., “ash”).

⁶Over the course of seven years, only two researchers visited the Duckworth Laboratory at the University of Cambridge to examine cremated remains (Biers 2025).

⁷In a tally of eight exhibitions featuring cremated remains, Biers (2025) found that six had little to no context other than “a vessel in a case” that sat in the background.

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