**Response to Paper by Redfern and Clegg by Malin Holst1, 2**

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In their paper, Redfern and Clegg draw attention to two key issues that have an adverse effect on English and Welsh osteological assemblages, including the commercial post-excavation analysis of human remains and academic research of human skeletons. This response to Redfern’s and Clegg’s paper is based on the experiences of these issues as a managing director of a commercial osteological company (York Osteoarchaeology Ltd) and as a lecturer in Bioarchaeology at the University of York and includes advice and suggestions from colleagues from both institutions.

**Reburial**

In 2008, the Ministry of Justice introduced the requirement to rebury human remains from archaeological sites in England and Wales two years after they were excavated, without any possibility of curation of the remains (Parker Pearson *et al*. 2011). This caused severe time constraints for the processing and commercial analysis of human remains, as well as preventing further research, as it was neither possible to promote the existence of these assemblages in such a short period of time, nor apply for grants with the aim of undertaking further research. After considerable debate and consultation with English Heritage, the Institute for Archaeologists, the Council for British Archaeology and other interest groups, the decision to rebury excavated human remains by the Ministry of Justice was revoked in 2011, based on the acknowledgement that the process was inhibiting research (Parker Pearson *et al*. 2011, Parker Pearson *et al*. 2013). As discussed by Redfern and Clegg, it is now decided on a case by case basis whether human remains will be reburied or curated by a museum, archaeological unit or university. This decision is usually made by the landowner, developer or, to a lesser extent, by the archaeological curator or unit. The fact that the fate of the remains is often determined by the former is an issue that ought to be reappraised, as the landowner or developer is less likely to have a full understanding of the value of the skeletal assemblage than archaeologists or osteologists and will have a greater interest in cost saving measures that often preclude curation.

Unfortunately, the three-year period during which restrictive reburial was in place coincided with long term reductions in funding for UK museums (Parker Pearson *et al*. 2013, 155). Museums are thus less able to curate space-absorbing skeletal collections, and this has meant that the trend of reburying human remains has increased further still, even beyond the reversal of the 2008 reburial legislation. This development has led to some unexpected problems, including a lack of guidance on how and where to rebury human remains and as such, reburial has at times occurred in inappropriate locations or in an unsuitable manner. This may mean that the skeletal remains deteriorate and are thus either lost to future researchers or their value is diminished, as the re-excavation of reburied human remains at Oakington in Cambridgeshire has demonstrated (Duncan Sayer *pers. comm.* 20/10/2017).

A further concern is the loss of human remains to future research and, as Redfern and Clegg have suggested, if an assemblage must be reburied, then a biobank might be one solution to be considered to mitigate against such loss. However, there are also concerns associated with biobanks. For example, once samples in a biobank have been used and thus destroyed by one research team, there is nothing left to facilitate future research. While biobanks may prevent complete loss of the reburied skeletal data, the question as to what to sample can often only be answered in the future. There are numerous examples of this, e.g., it was only recognised two years ago that the petrous temporal bone yielded the best-preserved DNA from ancient human remains and as such this bone was not previously sampled by bioarchaeologists (Pinhasi *et al.* 2015). Similarly, research only identified recently that dental calculus represents a highly informative substrate for analysis (Warinner *et al.* 2015). As such, biobanks are not anywhere near as informative and valuable for future research as curated full skeletal assemblages would be and cannot replace retention of entire skeletal collections. Furthermore, the discussion on biobanks so far has focused largely on future biomolecular research and not considered advances in macroscopic osteological and palaeopathological diagnostic techniques, for which full skeletal retention might be essential.

The issue of long term curation outside museums has recently been discussed in light of the possibility of more than 100,000 skeletons being disturbed by the construction of the high-speed rail line HS2, without the identification of an as yet satisfactory solution. In view of the issues discussed above, it is vital that Historic England, British Association for Bioarchaeology and Osteoarchaeology, Chartered Institute of Archaeologists, the Museums Association and other interest groups work together to develop a strategy that would permit cost effective and more easily accessible long-term curation of human remains to enable monitored ethical future research of commercially excavated skeletal assemblages.

**Destructive Sampling of Human Remains**

As discussed in the paper by Redfern and Clegg, biomolecular scientific techniques have developed at a rapid rate in the last few years as a result of both access to skeletal assemblages and a considerable increase in funding for biomolecular research (e.g. Buckley *et al.* 2017*,* Charlton *et al.* 2016, Green *et al.* 2017*,* Mackie *et al.* 2017, Martiniano *et al.* 2016,Olalde *et al.* 2017, Redfern *et al.* 2017, Warinner *et al.* 2017). This means that the information gained from human remains has increased dramatically, which has enabled both archaeologists and the general public to gain a considerably enhanced insight into the lives of our ancestors (Pitts 2016, 14-25; Mays *et al.* 2013) thus being very beneficial. However, as Redfern and Clegg have suggested, there are also potential difficulties with this increase in destructive analysis.

First, for ethical issues and matters of preservation, only the smallest possible sample should be taken for destructive analysis and where possible, a tooth or bone sample ought to be shared between researchers with the aim of increasing its potential and reducing the need for further sampling. We must also ensure that the sampling is ‘shared’ between skeletal assemblages (Roberts and Mays 2011), rather than well published collections being repeatedly targeted for destructive sampling, such as the medieval monastic cemetery of St Andrew’s, Fishergate, in York, while others are not sampled at all (York Bones Forum *pers. comm.* 2015). This may require better promotion of the lesser known skeletal assemblages. Due to the current lack of a widely accessible database for all skeletal collections curated in the UK, skeletal assemblages may not be well known, particularly when they are curated by archaeological companies and the reports are solely available in the grey literature. Similarly, it may be difficult to find out whether any biomolecular analysis has previously been undertaken on the remains, as the curation records that a museum may comply with may not be instigated by an archaeological unit.

Secondly, access to skeletal collections for future research relies on the support of the developers, the excavating archaeological unit, osteologist or the museum curating the remains. As such, it is essential that the institution providing the human remains and the guidelines set by them are respected, that this organisation is included in discussions and that the information gained from the research is shared within a short time frame and in an accessible manner. The institution providing the remains in addition to vital contextual information should at very least be acknowledged for their contribution, or could be included as authors in any forthcoming publications, as my colleagues have generously been doing.

From the view of a curator, a poor and potentially harmful outcome of a research project occurs when the researcher does not provide them with feedback, which may discourage them from considering research project requests in the future. An even worse situation, as Redfern and Clegg have indicated, arises when researchers share their samples with others without permission from the organisation providing the samples, thus leading to publications that the curators have no control over. This is particularly problematic in those situations where developers have concerns that publication may damage their potential of selling houses on a cemetery site due to some buyers being put off by the presence of human remains. On the other hand, further research projects and collaborations are encouraged by respecting rules on the treatment of samples, acknowledgement of the body that provided the samples in publications and, in particular, by provision of feedback.

A further issue that can put pressure on the relationship between skeletal curator and the researcher is the often different timelines and different mediums of publication. While the archaeological unit often has a slower turnaround and would like to publish monographs or reports, scientific researchers are frequently under immense pressure to publish their results quickly in scientific journals, at times even before the archaeological report has been completed. This can create tension over information sharing and intellectual property rights.

Thirdly, it must be ensured that any additional research increases our understanding of the curated skeletal population. The best way to guarantee this is for the commercial company who excavated the remains, or the museum that curates the remains to share as much of the contextual information as possible with the researchers. In return, the researchers must feed back their information in an accessible manner to the archaeologists or curators. If this succeeds, it leads to a ‘win-win’ situation, whereby everyone involved in the project gains greater understanding. The best possible outcome is achieved when there are round table discussions between researchers, osteologists, archaeologists, historians and, if possible, even descendants of the skeletons. It must be acknowledged that such projects take a lot of often unpaid time, goodwill and enthusiasm from all parties involved. However, the positive outcomes of such projects can be vastly increased for all involved.

**Making Information Gained from Human Remains More Inclusive**

One aspect of archaeological human remains that could perhaps have been considered in more detail in Redfern and Clegg’s paper is their potential for engaging the general public in archaeology. Past humans are of interest to current society because they are easy to relate to. Archaeological skeletal remains also provide an excellent way of involving the public in topical archaeological developments (Kalimeris 2016, Sayer and Sayer 2016). For example, recent exhibitions at the Yorkshire Museum and the Museum of London that included the subject of Roman migration and African Romans living in the two cities provoked much discussion and among many positive reactions also some negative comments by prejudiced museum visitors. The exhibitions stimulated debate and aided in educating the general public about the multicultural nature of society in Britain 2,000 years ago (Buy *pers. comm.* 2015; Redfern *pers. comm.* 2016).

The Washburn Heritage Centre, funded by a Heritage Lottery Grant, is one example where all of the aspects discussed above have come together in a most positive way. The churchyard at Fewston had to be partially excavated for the construction of a heritage centre, leading to the recovery of 156 skeletons. Initially, insufficient Heritage Lottery Funding did not cover the full analysis of the skeletons, leading to a second HLF bid. This was the start of a successful community project, including the full osteological analysis of the skeletons, isotope and dental calculus analysis by the University of York and Durham University, an osteological workshop, several exhibitions and talks on all aspects of the research, while the descendants of the skeletons had the unique opportunity to see the remains of their ancestors. The local community had a significant input into the project by undertaking extensive historical research, focusing on the named skeletons and the history of the area, aided by information from the diary of a local man that was transcribed by one of the osteologists. The project culminated in the reburial service of the skeletons, which was attended by the local community, descendants of the skeletons, the archaeologist and the researchers and where the local choir sang a song written about the data gained from the research. A permanent exhibition, series of talks, a film and booklet (Alexander *et al.*  2017) have been produced and a monograph is being written. The research revealed that pauper children from southern England had been apprenticed to the local mill at Blubberhouses and were interred in the local graveyard, explaining the unusual pathological and isotopic signatures of some of the skeletons excavated in this remote rural churchyard. This was an unforeseen result that would not have been achieved without such multidisciplinary research.

While the project required goodwill, passion, time and energy by all involved, the members of the project think that it has been a most satisfying success. It is clearly not possible to achieve the same interest, involvement and outcome with all projects, but an attempt ought to be made to involve the general public where possible.

**Conclusion**

In conclusion, in my experience, collaborative research projects that involve sharing of samples or information, mutual respect, discussion, and acknowledgement tend to achieve the best results for all involved and ought to be aspired to wherever possible.

**Disclosure statement**

No potential conflict of interest was reported by the authors.

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