[P15] HASDiP -The Hulton Abbey Skeletal Digitisation Project.

John Cassella[1], Mary Lewis[2], Roger Brown[3] and Paul Lucking[4]

[1]Department of Forensic Science, Faculty of Science, Staffordshire University,
[2] Department of Archaeology, School of Human and Environmental Sciences, University of Reading,
[3] Faculty of Arts, Media and Design, Staffordshire University
[4]Faculty of Computing, Engineering and Technology, Staffordshire University

A project funded by JISC / Academy Distributed e-Learning (DeL) Programme II

Keywords: Skeletal, archaeology, digitisation, photography

Abstract
Skeletal material although reasonably robust, deteriorates with handling often damaging important archaeological specimens. In addition, the educational value of these human remains is often limited to the institution in which they are held. The aim of this pilot project was to produce a digitised resource from rare skeletal material recovered from Hulton Abbey in Stoke-on-Trent, Staffordshire. These resources may be actively used for forensic science and for archaeology teaching or indeed as a general introduction to osteology in a more innovative way. They may equally be adopted by other organisations and institutions in a variety of subjects due to the interdisciplinary nature of the program illustrating the enormous potential of these digitised resources. The high quality images can be used for research in biological anthropology, palaeopathology and forensic anthropology, but it has also historical applications as well as providing teaching aids in photographic studies, computing and e-learning technologies. Digital cataloguing (in terms of software design) also allows in the future for comparative examination of the skeletal material, allowing specimens of academic importance to be utilised by undergraduates, postgraduates and indeed academics at all levels. This report illustrates the process of image capture of the skeletal material and the subsequent software development in order to produce a package which will be useful to diverse group of users at differing academic levels. There is clearly an opportunity to develop this project further as a useful resource and to have the added value of preserving at a national level, existing skeletal material that may be very delicate and friable.

Introduction
The aim of this project was to produce a digitised record/resources from skeletal material recovered from a well publicised excavation of historical importance in Stoke-on-Trent, Staffordshire; this excavation took place at Hulton Abbey. Whilst the initial aim of this project was to produce digitised resources which will be actively used for forensic science and biomedical/biological science teaching at Staffordshire University, these can equally and readily be adopted by other institutions. In addition, due to the interdisciplinary interest in this work, the potential for re-purposing and re-use of these digitised resources is enormous. Due to the anatomical nature of the skeletal excavations there is potential for use in anthropological and biological (e.g. disease) studies and there is also historical and religious sociological and cultural applications as well as in photographic studies, computing and e-learning technologies.

Excavations at Hulton Abbey, Staffordshire 1987-1994
Hulton Abbey was a minor Cistercian monastery in North Staffordshire (England), founded in 1219 and finally dissolved in 1538. The final report on the archaeological excavations undertaken there between 1987 and 1994 was published as a book in 2005 (see Boothroyd and Klemperer). In particular, the chapter house was uncovered and re-assessed and the eastern part of the church and north aisle were completely excavated, together with the eastern half of the nave.

The excavations are described by area and chronological phase with detailed specialist reports including architectural stonework and decorated floor tiles. An extensive programme of sampling and analysis of pollen remains from burials was also completed. The remains of 91 individuals, mainly men but also women and children, are reported on in detail, with sections on abnormalities and pathology as well as medieval burial goods such as a wax chalice and wooden wands. Comparisons with other published monastic sites in the region help to place Hulton into a wider context. The skeletal digitisation project allowed some of the skeletal material excavated from Hulton Abbey to be systematically and fully photographed and when appropriate, video recorded.

Once this had been achieved, the images and video clips were incorporated into a bespoke software package. Measurement scales were included as far as possible so that measurements from photographs could be made. This cataloguing should allow comparisons and examination of the skeletal material in a full and precise manner so as to make it helpful and pedagogical useful for a variety of undergraduate and post graduate students.

The skeletal material can be used by educationalists to disseminate findings about the people that were buried at Hulton Abbey. The digitised *virtual catalogue* will allow the skeleton to be examined by a wider audience, whilst preventing the unavoidable damage that occurs when handling such friable material and should ensure the skeleton lives on for many years after its physical manifestation ends.

Educational application

This project is of particular interest to the educational world as it will ensure a digital preservation of the material for their future. Forensic science is still a relatively new and emerging discipline within the physical sciences arena and as such, there are limited resources available to a discipline which is quickly expanding. This project will provide initial resources that may be utilised by the whole forensic science community and further afield. In addition, there is great potential for wider use of the resources and therefore this project has the potential for offering great educational impact.

As part of the project, extensive dissemination to other disciplines/subjects about the methodology of making and using such digital resources of such digital resources has been undertaken. Currently there appears to be no obvious and publicly available resource of this kind. There was clearly an opportunity to develop a valuable resource and also to have the added value of preserving the existing skeletal material that is very delicate and friable. There are some resources available to the archaeology community, but nothing of the scope that this project aimed to achieve. The project has shown that more detailed information in and on the skeletal remains can be recorded and demonstrated than previously thought possible. This data can subsequently be easily measured and quantified.

For this project to be a successful, not only is the permanent preservation of the friable skeleton paramount, but so too, is the use of the digital resource by a variety of users for their ***own*** particular learning outcomes.

Ideally, those who utilise this digitised resource for their own purposes will have set learning outcomes which generically could include:

- Understand and undertake the methods of producing accurate archaeological/anatomical drawings/photography
- Understand and apply the requirements of archaeological/anatomical recording procedures.

In addition, the following transferable skills could be developed and enhanced:

- Team working and independent working;
- Critical thinking;
- Communication skills - written and oral;

- Observational skills;
- Problem solving skills;
- Recognition, description and reporting skills;
- Accuracy in working and reporting;
- Analytical and practical skills;
- Numerical skills; and
- Enhanced visual literacy in the making, understanding and interpretation of forensic photography.

Software Use

Adobe Director was used with plug-in technology from INM (Integrated New Media) to build a cross platform capable delivery system. This allowed access to high quality document data through a database driven architecture. Due to the high quality nature of the document data media delivery is facilitated on a DVD-Rom. Steps were taken to ensure a minimal amount of manipulation to the original photographic image data to ensure that their quality was not compromised, followed by the process of conversion into searchable Acrobat documents that can be protected to prevent access outside the main interface.

Discussion

Early indications of its use suggest that it is adding a unique dynamic to the process of learning about basic key skills which support sciences at undergraduate level. The historical context that these bones add to the study of osteology and anatomy in general clearly suggest that students engagement is enhance by the real life contextualization offered in this project.

The package has only recently become available to the academic and public community and so evaluation of its use will take the next 12 months to allow for an academic cycle of its use. The data will be examined and reported on the Higher Education Academy website. Early feedback suggests it has been well received across a range of academic subject areas including science and the Arts. Some colleagues have also taken it into Schools where it has been used in the context of the history of the individual and the fate that befell him.

Free copies of the software are available upon request from the Higher Education Academy Physical Science Centre website (www.heacademy.ac.uk/physsci/).

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Figure Legends to Images

Figure 1: Close-up of cut marks to the left clavicle

Figure 2: Close-up of cut marks to the left clavicle

Figure 3: Decapitation by cutting through the cervical vertebra

Figure 4: Sagittal cuts occurred through T11 to L2

Figure 5: Example of Screen Shot from the Software Package

Figure 6: Example of Screen Shot from the Software Package

Figure 7: Example of Screen Shot from the Software Package

Figure 8: Example of Screen Shot from the Software Package

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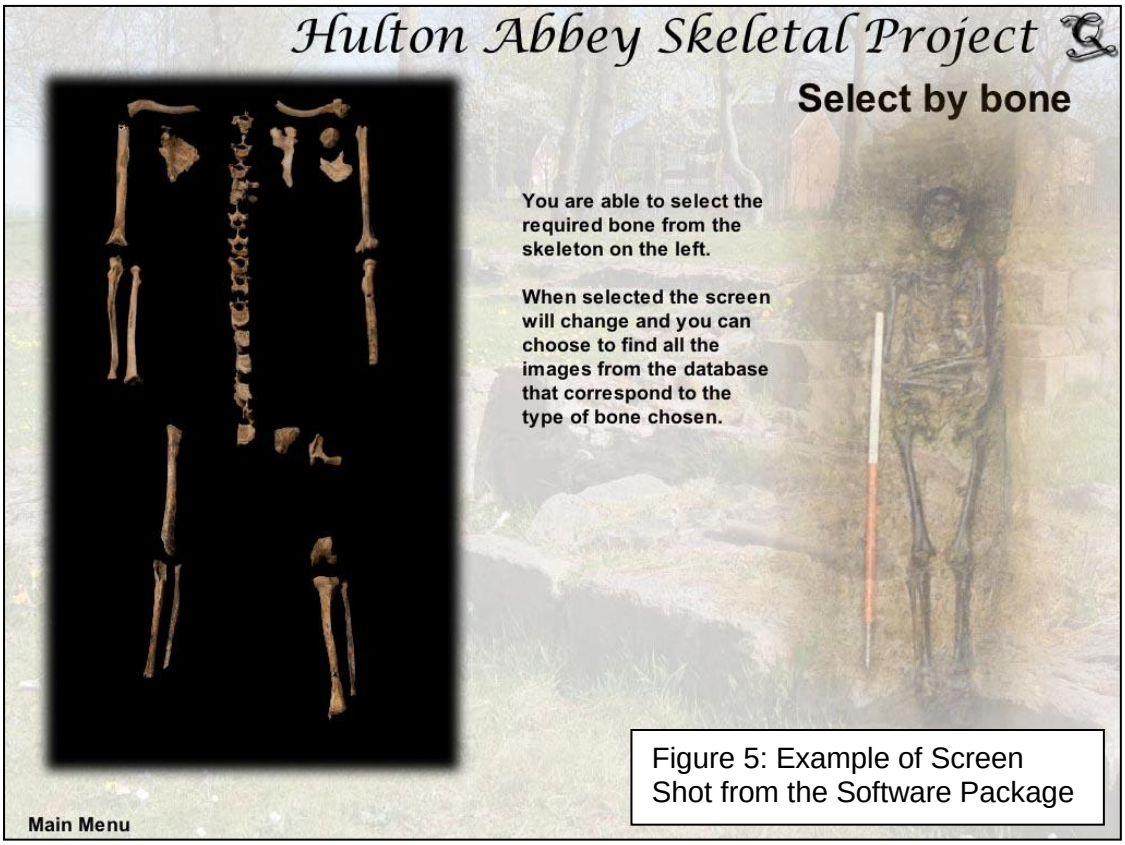

Figure 5: Example of Screen Shot from the Software Package

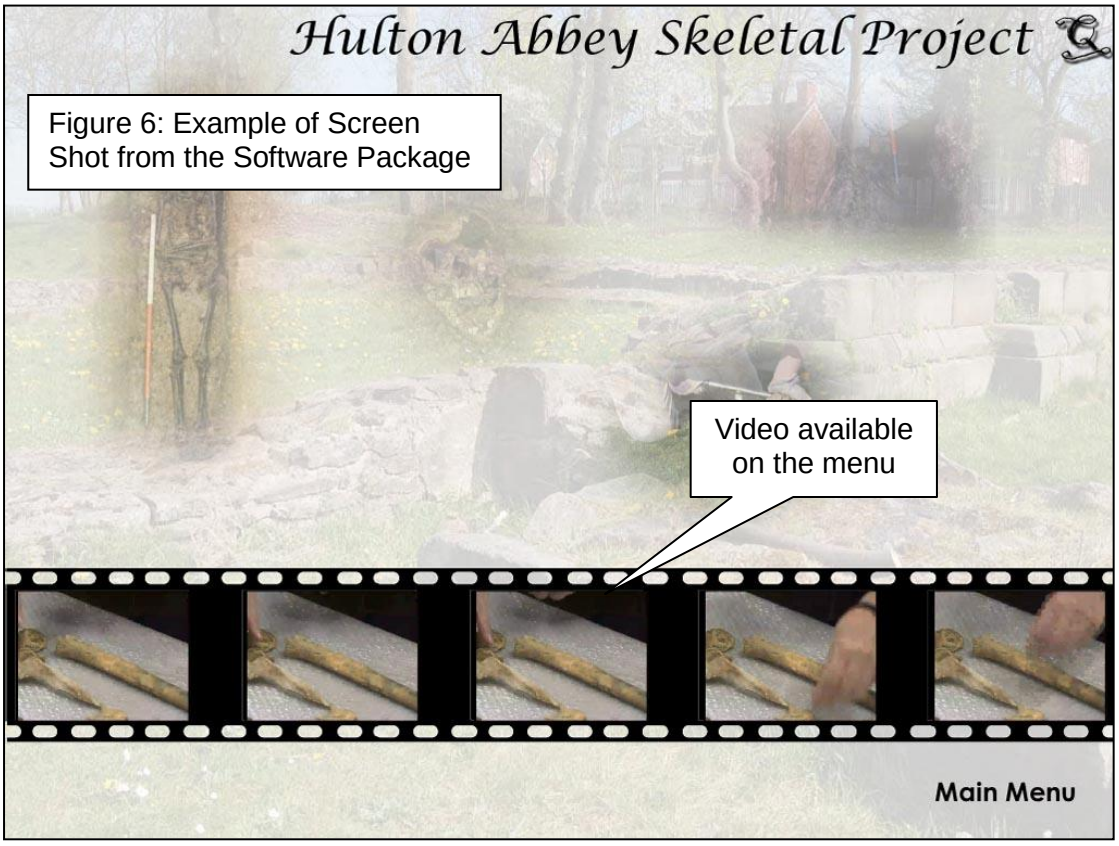

Figure 6: Example of Screen Shot from the Software Package

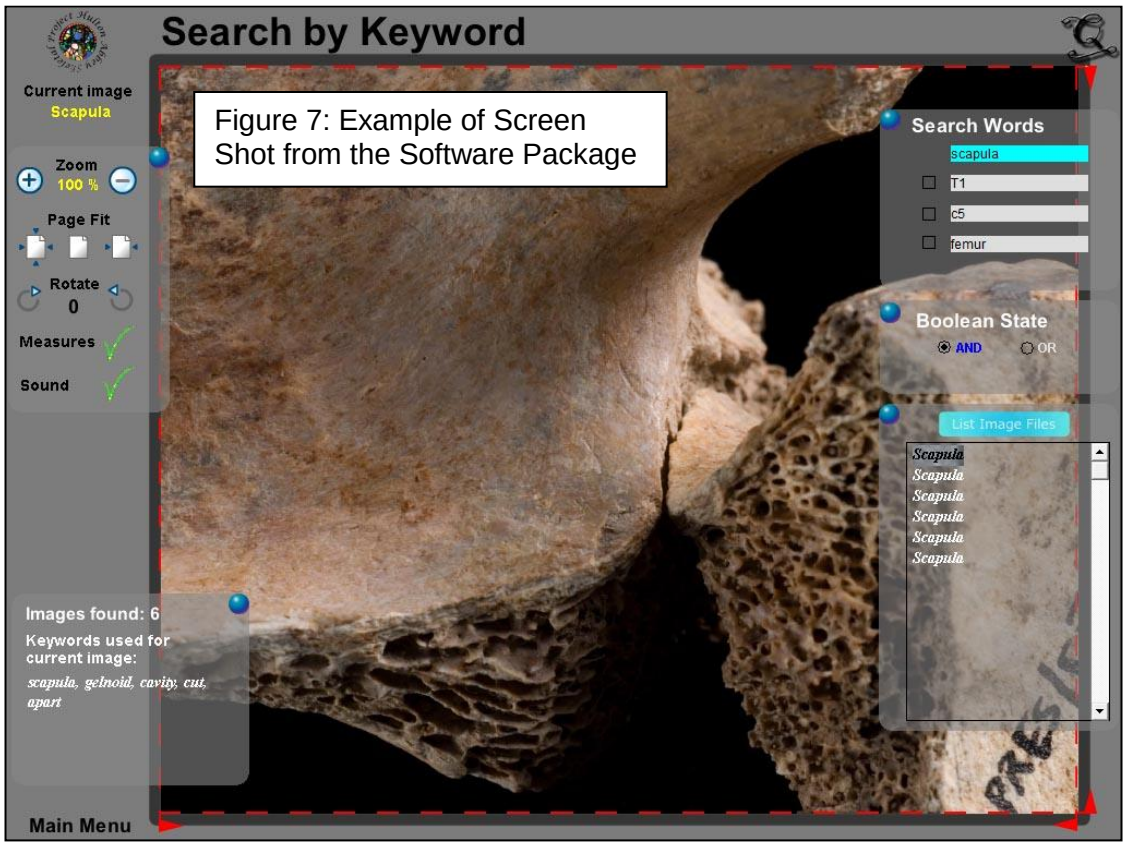

Figure 7: Example of Screen Shot from the Software Package

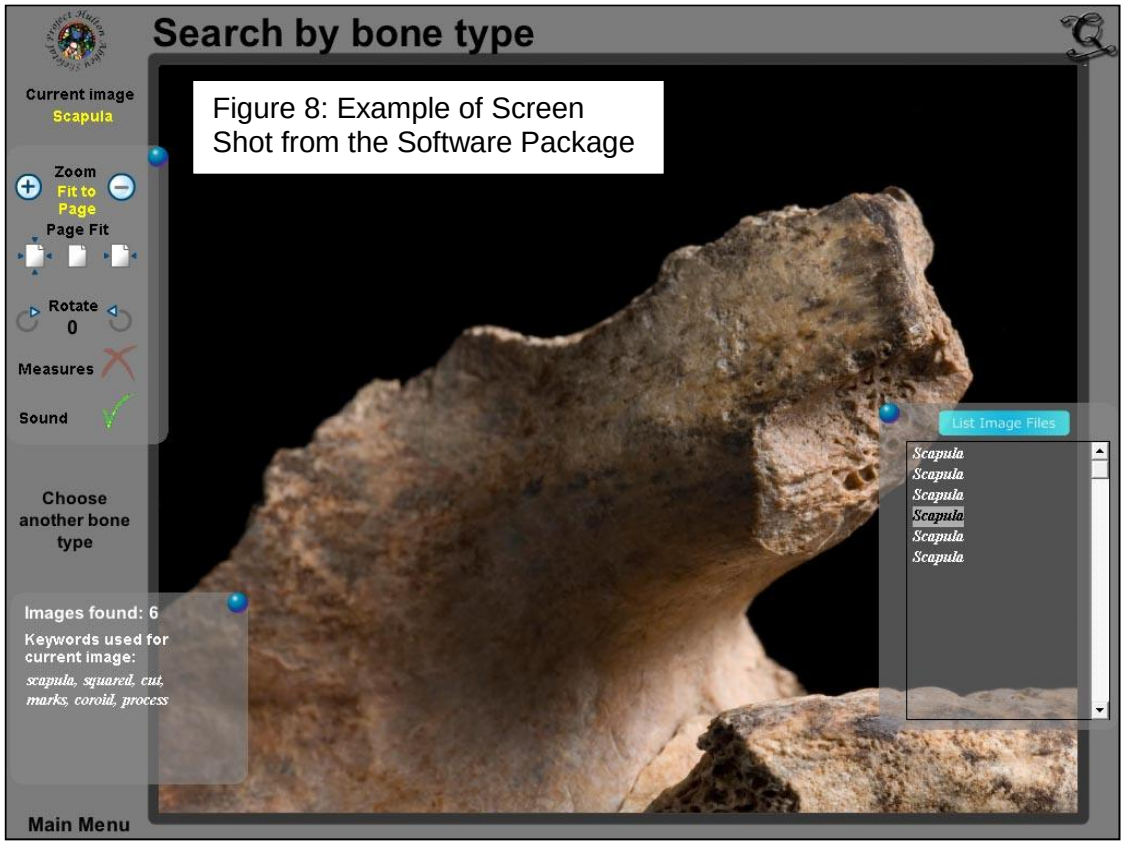

Figure 8: Example of Screen Shot from the Software Package