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Paabo, S. (1989). Ancient DNA: extraction, characterization, molecular cloning and enzymatic amplification. *Proceedings of the National Academy of Sciences, USA,* **86**: 1939-1943.

Szalay, F.S. (1975). *Phylogeny, adaptation and dispersal of the tarsiiform primates.* In Luckett, W.P. & Szalay, F.S. (eds.), *Phylogeny of the Primates, a Multidisciplinary Approach.* New York: Plenum Press, 91-125.

Szalay, F.S. (1994). *Evolutionary History of the Marsupials and an Analysis of Osteological Characters.* Cambridge University Press.

Thomas, R.H., Schaffner, W., Wilson, A.C. & Paabo, S. (1989). DNA phylogeny of the extinct marsupial wolf. *Nature,* **340**, 465-467.

Thomas, W.K., Paabo, S., Villablanca, F.X. & Wilson, A.C. (1990). Spatial and temporal continuity of kangaroo rat populations shown be sequencing mitochondrial DNA from museum specimens. *Journal of Molecular Evolution,* **31**: 101 -112.

Wible, J . R. (1990) . Petrosals of late Cretaceous marsupials from North America and a cladistic analysis of the petrosal in therian mammals. *Journal of Vertebrate Paleontology,* **10**: 183-205.

THE OSTEOLOGICAL COLLECTIONS OF THE ZOOLOGY DEPARTMENT, LIVERPOOL MUSEUM.

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Introduction.

The osteological collections at Liverpool Museum amount to about 3,600 specimens, of which by far the greatest number are of mammals. Most of this material is housed in 36 wooden osteological cabinets, which were purpose built (many in-house) over several years (fig.1). They measure 220cm high, 93cm wide and 77cm deep and have a varying number of wooden drawers according to the height needed for the specimens stored. Eight of the cabinets are divided vertically down the centre so that they take half-width drawers (fig. 2); these were designed for the smaller specimens such as the birds and rodents.

Figure 1

There are also mammalian skulls kept with their associated skins in the study skin collection, which is now housed in metal cabinets. A few specimens of awkward size, such as a pair of champion African elephant tusks, are stored with the larger mounted mammals in a separate storeroom. All these cabinets and storage areas are on the Upper Horseshoe Gallery of the Liverpool Museum, but some osteological specimens are in use on the floor above by the Natural History Centre or are on display on the Natural History Gallery. One of our most famous specimens - the skeleton of Ambush II, the Prince of Wales' horse and the Grand National winner of 1900 - is on display in the Museum of Liverpool Life, next to the Maritime Museum on the waterfront. Ambush, who was genteelly flaking and who for some reason had had his real skull swapped with one of a zebra, was completely renovated for Liverpool Museum's Grand National Exhibition of 1989 and is now more suitably depicted with his original skull and in a galloping position (originally, he stood foursquare).

The osteology specimens can be summarized as consisting of one or more of the following sorts of material: antlers, horns, skeletons, skulls, loose mandibles, postcranial material without skulls, skulls with skins or mounts, teeth or tusks.

The small amount of human skeletal material that is held for comparative zoological reasons is stored in the same cabinet as other primates, but in separate clearly marked drawers. It is not used for general handling in places such as the Natural History Centre; replicas are used if required. These procedures are designed to satisfy the scientific and educational role of human material, whilst acknowledging the stated requirement of the Trustees of NMGM that we treat human remains with sensitivity.

Figure 2

Curation and Re-storage.

The curation and re-storage of the osteological collection has taken place over the last 20 years. In 1975 the collection was housed in a jumble of large cardboard boxes, in no particular sequence, on 'Dexion' racking covered with plastic sheeting making access impossible for either staff or visitors. The game heads (which were piled on the top rack) were the first to be removed, cleaned, mounted on plinths and then hung on racking; a position far less hard on their ears. They now hang in sequence, covered with a moveable canopy. They include mounted skulls and antlers as well as trophy skins.

As the new osteological cabinets became available, the specimens were removed from the large boxes bit by bit, each piece being cleaned, mended, identified and properly labelled (figs 3 and 4). Nearly all the specimens are now in

individual cardboard boxes, of suitable size, with a further protective plastic bag and with an acid-free (and fray-free) cottonwool lining if necessary. Tissue paper is used, instead of cottonwool, for specimens which might have a tendency to get entangled. The white osteology boxes, which are covered with acid-free paper, have been made for us over the years, in specified sizes, by North-West Box Makers of Stockport. Both the lid of the box and the specimen itself are clearly labelled in ink with scientific name, form of specimen and the accession number. The labels, which are of glossy white card and with a brass eyelet, are pre-printed "Liverpool Museum" and are attached securely to the specimens with strong white thread tied in a double knot.

Figure 3

In many cases the osteological specimens were found to be unregistered and therefore, for inventory purposes, have been given a recent accession number; thus the preponderance of recent dates associated with the specimens (for instance, some specimens are clearly marked as being from the collection of the XIIIth Earl of Derby, which came here in 1851, but they were not accessioned then and are now marked 198x.xxx etc). Many specimens were identified, and their catalogue entries found, after massive detective work involving such clues as pencil scribbles, green scalloped labels, or the method used to wire articulated skeletons together. Scraps of paper in the bottom of a particular box full of items could sometimes be re-united with the correct specimen by a process of elimination, or even by matching the hole in the label with the string-knot left on the specimen.

Figure 4

One particular jigsaw puzzle was a large card, on which several bird sterna had been glued above their labels and from which they had fallen. After many hours work each had been matched up with the marks left on the card by the original glue, which could be fitted to traces left on the bones themselves. The value of this endeavour only emerged later, when it transpired that two of the sterna were all that remained of the types of *Caprimulgus tamaricis* Tristram and *Kakatoe citrino-cristrata* Fraser.

All the specimens, whether in osteological cabinets or skin drawers, are stored in an amalgamated taxonomic sequence arranged by various check list orders for different classes; for instance the order in Honacki (1982) was followed for that particular section, Peters (1932-1987) for the birds. A catalogue which will be produced in the next year will follow the same taxonomic order as these references for order, family and genus, followed by species in alphabetical order. A purely alphabetic index of current scientific names, both genus and species, will be provided. The catalogue will also include complete donor, collector and locality indices, arranged alphabetically.

Notable parts of the Collection.

Perhaps the most important component of the osteology collections are the specimens from the collection of the XIIIth Earl of Derby, whose seat at Knowsley Hall (near Liverpool) housed in the early 19th Century a most spectacular and comprehensive collection of live mammals and birds. Lord Derby also commissioned specimens from collectors all over the world for his museum at the Hall; into this museum too went the prepared skins and skulls of animals from the menagerie. This collection was bequeathed to the City of Liverpool upon the Earl's death in 1851 and indeed founded this institution. It is one of the most historically important bird and mammal collections in the world, full of type specimens and examples of species now extinct or endangered.

Figure 5

Many of the Derby osteology specimens, like the skins, have importance on taxonomic grounds, or because of the present conservation status of the animal in question. Together with types obtained from other sources than the Derby Collection, the taxonomically significant specimens amongst the osteological material are as follows:

Soricidae.	*Crocidura bottegoides* Hutterer & Yalden, 1990. 3 skins and skulls from Katcha, Bale Province, Ethiopia in 1986. Paratypes.
Soricidae.	*Crocidura harenna* Hutterer & Yalden, 1990. 6 skins & skulls from Ratcha, 1986. Paratypes.

Bovidae.	*Cephalophus rufilatus* Gray, 1846. Skull. Collected by Thomas Whitfield in Sierra Leone. Earl of Derby's collection. Syntype.
Sciuridae.	*Pteromys momonga* Temminck, 1844. Skin & skull. From Japan. Earl of Derby's collection. Possible syntype.
Anomaluridae.	*Anomalurus peli* (Schlegel & Muller, 1845). Collected by H.S. Pel, "Cote du Guinea", West Africa. Earl of Derby's collection. Possible syntype.
Cricetidae.	*Brachyuromys ramirohitra* Forsyth Major, 1896. Skin & skull. Collected by C.I. Forsyth Major in Ampitambe Forest, Madagascar, 1895. Possible paratype.
Cricetidae.	*Gymnuromys roberti* Forsyth Major, 1896. Skin & skull. Collected by Forsyth Major, as above. Paratype.
Muridae.	*Notomys longicaudatus* (Gould, 1844). 2 skins & skulls. Collected by John Gilbert at Toodyay and the Moore's River, Western Australia, in 1843. Earl of Derby's collection. Paralectotypes.
Muridae.	*Pseudomys australis* Gray, 1832. 2 skins & skulls. Collected by Gilbert on the Darling Downs, southern Queensland, in 1844. Earl of Derby's collection. Paralectotypes of Mus lineolatus Gould, 1844.
Muridae.	*Pseudomys nanus* (Gould, 1858). Skin & skull. Collected by Gilbert on the Victoria Plains, Western Australia in 1842. Earl of Derby's collection. Paralectotype.
Cacatuidae.	*Cacatua sulphurea citrinocristata* (Fraser, 1844). Sternum & pectoral girdle. Died in Knowsley Menagerie, 1850. Belongs to type specimen, which is missing.
Caprimulgidae.	*Caprimulgus nubicus tamaricis* Tristram, 1864. Sternum & pectoral girdle. Collected by Canon H.B. Tristram at Ain Feshkhab, Dead Sea in 1864. Tristram Collection. Probably from syntype, which is no longer extant.
Sturnidae.	*Aplonis zelandica maxwellii* Forbes, 1900. Sternum & pectoral girdle. Collected by Fornest on Santa Cruz Island, Western Pacific. Tristram Collection. Probably from type specimen.

Extinct species are represented by bones such as a skull of the Falkland Island Wolf *Dusicyon australis,* those of Moa and Elephant Bird, of Great Auks and Dodos, and by the subfossil skeleton of an extinct goose (*Cnemiornis calcitrans*) from New Zealand - as well as by bones from long-gone Mauritian Fruit-bats and Chatham Island Rails.

Undoubtedly the collection with the most osteological style is that of Mr Guy Otter, presented to the museum in 1961. The collection had belonged to his grandfather, Sir Edmund Loder (1849-1920), and is an immaculately prepared series of 200 skulls and skeletons. Many of these originated from the Loder's menagerie in the grounds of Leonardslee, their home in Sussex. We recently managed to track down Guy Otter, now in his eighties, at his home near Poole. He was delighted that his collection should prove such an important part of this catalogue and gave us valuable background information on the specimens, such as the fact that a number of the game heads from the Otter collection are in Rowland Ward's Records of Big Game (Dollman & Burlace 1935).

We also spoke to Sir Edmund Loder's great-grandson, Mr R.R. Loder, who lives adjacent to the original house at Leonardslee. He told us that wallabies still live there, but the colony of beavers that had been the pride of the menagerie died out after the breeding females were given to the London Zoo. However, the beaver restraining fence can still be seen. Mr Loder remembers seeing mouflon and capybara in the grounds; Guy Otter particularly recalled the Rocky Mountain goats.

The Guy Otter collection came to us through the recommendation of the world deer expert, Mr G.R. Whitehead.

Other interesting specimens include those of Canon H.B. Tristram, of Durham Cathedral, who sold his main collection of birds to the Liverpool Museum in 1896. There are also many specimens from the time of the Liverpool Free Public Museum, immediately after the museum was founded.

The point of separation between Geology and Zoology at the Liverpool Museum has been somewhat clouded in the past; some specimens drifted between the two departments until a policy decision was made in the early 1980s; all post-4,000 Bp material (marking a distinct local change in sea-level) was to be held in Zoology. Thus we immediately received a trolley piled with drawers which included the Kendal collection of cave material, mostly from Helsfall Point, and given to our safekeeping by Kendal Museum in 1960.

The osteology collections also include some interesting local sub-fossil material: horses and aurochs from the River Weaver alluvium, pigs and aurochs from the Wirral shore, Red Deer from Blundell sands (to the north of Liverpool). These ancient bones will prove invaluable for the new Merseyside Archaeology and Landscape Gallery, being planned for 1997, which will illustrate the huge changes in this area since the last ice-age.

Uses of the Collection

These are very wide, and have expanded remarkably since the collection became accessible and documented. Perhaps the most common use is for education; the specimens are much more robust than other museum specimens and are thus ideal for teaching and display. It is interesting to look back after over ten years' successful operation of the Liverpool Museum's Natural History Centre, and remember that the first trial "hands-on" session in 1982 used osteological specimens; they are still a great stalwart in the Centre. One of the most popular specimens has been the "Build the Badger" puzzle - involving reconstructing a badger skeleton. The specimens are also used extensively by the two Liverpool universities for

teaching, both for natural sciences and veterinary courses.

Many artists use the specimens; the clean lines provide an ideal model for still lives and our specimens are immortalized in many portfolios. However, the scientific uses of the specimens are paramount and many are prepared with archaeological work in mind. The least fallible way to identify an archaeological bone is by direct comparison with a bone whose provenance is certain; thus the bird osteology collection has been built up over the last ten years to include all common British birds past and present. The collection is used by Chester Museum's Field Archaeology Unit to identify their excavated material, and many other archaeological reports have been based on our material. One of the sources of income for the department has been the contracts undertaken by the Curator of Birds & Mammals on the identification of bird bones from archaeological excavations.

Database Format

All specimens have a unique entry on DBase III and the information is arranged as follows:

Taxonomic classification number.
Family.
Genus & species.
Authority and date of description.
Accession (registration) number.
Sex.
Form of specimen.
Locality where specimen was collected.
Collector's name.
Date of collection.
Donor or seller of specimen.
Date of acquisition by the museum.
Notes.

Acknowledgements

The curation of the Osteology collection would not have been possible without the help of a great many people. The most important of these is Tony Roberts an archaeo-zoologist and natural curatorial ferret, who has, in several periods on contract to the museum, curated the main bulk of the mammal and lower vertebrate specimens. It was he who made the connection between green labels, "Leonardslee" and the Otter collection, and who located the family responsible for the specimens.

I would also like to acknowledge the work that Tony Parker (Assistant Curator, Vertebrates) and Phil Phillips of the Information Technology Department have both done, particularly in using their expertise in computing techniques to help prepare the forthcoming catalogue. Professor Robert Roaf, a retired orthopaedic surgeon, spent several years helping to document and accession the collection. Others have helped greatly with the identification of specimens, notably the Mammal and Bird Sections of the Natural History Museum in London. I would also like to thank Valerie Evans, Malcolm Largen, George McInnes and Ian Wallace of NMGM for their help.

I am very grateful to the Director and Trustees of National Museums & Galleries on Merseyside, for their support over the many years that the osteology collection has benefitted from curatorial time.

This paper is based on the Introduction to the Catalogue of the osteological specimens in the collections of the Zoology Department, Liverpool Museum, which is being presently edited for publication.

References

Dollman, G. and Burlace, J.B. (1935). *Rowland Ward's records of big game.* (10th Edn) London, Rowland Ward Ltd., Piccadilly.

Honacki, J.H., Kinman, K.E. & Koeppl, J.W. (1982). *Mammal species of the world.* Allen Press & the Association of Systematic Collections, Kansas.

Peters, J.L. (1932-1987). *Check-list of birds of the world* (Volumes I-XVI). Museum of Comparative Zoology, Cambridge, Massachusetts.

THE PREPARATION OF SMALL MAMMAL SKULLS

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There are a number of methods available for the preparation of small skulls and it will depend on the facilities available as to which method is used. It may also depend on your disposition and sense of smell. Methods include maceration, burial, insects, boiling, sodium perborate, and enzymes.

Maceration in either cold or warm water is an effective way to clean bones but you will need a laboratory with a good extraction system or you risk becoming very unpopular.

Burial in a sand tray outdoors removes the problem of smell but it does take a bit longer.

Insect preparation is also very good. A *Dermestes* colony will give very good results, but as it has to be sited away from the collections it does present problems. I have never been brave enough to try this, mainly because if ever a Dermestes was found in the collections I would probably have to leave the country under police protection.

Boiling, or rather simmering gently, is a common way to prepare skulls, the meat being scraped off when it is easily removed. If the boiling is overdone, damage can occur, so be careful. This method can also be smelly.

Sodium perborate works very well on small mammal skulls. After simmering and cleaning the skull, add Sodium perborate to the water, approx. 2 tablespoons per litre, and leave to cool overnight, then wash thoroughly.

Enzymes - Papain, Trypsin, Pepsin etc. are a very effective way of cleaning skulls. However. they do have the disadvantage of being very smelly and the staff at Liverpool Museum were warned of a health risk from the scum which forms on the surface when treating the bones.

Enzymes. At Bolton I use enzymes in the form of biological washing powder. I happen to use Persil but I am sure they are all much the same (not always good for getting grease out of your shirts but great on weasel skulls). As with all methods the skull must first be skinned and roughly fleshed. The more flesh you clean off now the quicker the cleaning process will be. The skull is then placed in a suitably sized container of water at approx 400°C and the detergent added. Keep the water at a constant temperature and agitate frequently. Check the skull now and again and scrape off the remaining flesh as it becomes easy to do so. This can be done with a variety of tools - knives, scalpels, brushes and scrapers. Scrapers can be fashioned from wood